

Before the  
Federal Communications Commission  
Washington, D.C. 20554

In the Matter of	)	
	)	
<b>The Establishment of Policies</b>	)	IB Docket No. <u>99-81</u>
<b>and Service Rules for the Mobile</b>	)	
<b>Satellite Service in the 2 GHz Band</b>	)	

### REPORT AND ORDER

**Adopted: August 14, 2000**

**Released: August 25, 2000**

By the Commission: Chairman Kennard, Commissioners Ness and Tristani, issuing separate statements; Commissioners Furchtgott-Roth and Powell approving in part, dissenting in part, and issuing a joint statement.

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## I. INTRODUCTION

1. In this *Report and Order*, the Commission takes the next step toward authorizing a new generation of mobile satellite services (MSS).<sup>1</sup> These satellite systems will provide new and expanded regional and global data, voice, and messaging services using the 2 GHz frequency band (2 GHz MSS). The 2 GHz MSS systems also will enhance competition in mobile satellite and terrestrial communications services, and complement wireless service offerings through expanded geographic coverage. 2 GHz MSS systems will thereby promote development of regional and global communications to unserved communities in the United States, its territories and possessions, including

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<sup>1</sup> MSS is defined as a radiocommunication service: (1) between mobile earth stations and one or more space stations, or between space stations used by this service; or (2) between mobile earth stations, by means of one or more space stations. This service may also include feeder links necessary for its operation. 47 C.F.R. § 25.201.

rural and Native American areas, as well as worldwide.<sup>2</sup> The policies and rules we adopt in this *Report and Order* are designed to expedite the authorization process and encourage utilization of 2 GHz spectrum for delivery of the benefits of MSS to all U.S. consumers nationwide.

2. Pursuant to a 2 GHz MSS processing round initiated in 1997, nine parties filed proposals to operate 2 GHz MSS systems in the United States.<sup>3</sup> Specifically, the Boeing Company (Boeing), Celsat America, Inc. (Celsat), Constellation Communications, Inc. (Constellation), Globalstar, L.P. (Globalstar), Iridium LLC (Iridium), and Mobile Communications Holding, Inc. (MCHI) filed applications for U.S. space station licenses;<sup>4</sup> and ICO Services Limited (ICO) (a United Kingdom company), Inmarsat Horizons (Inmarsat) (an inter-governmental satellite organization), and TMI Communications and Company, Limited Partnership (TMI) (a Canadian entity) filed letters of intent (LOIs) seeking reservation of spectrum to serve the U.S. market from non-U.S.-licensed systems.<sup>5</sup> All system proponents must amend their applications or LOIs to conform their proposed systems to the requirements and policies we adopt today. Given the enormous potential benefits these systems offer, and the public interest in their timely deployment, amendments to applications or LOIs must be filed no later than 30 days after a summary of this *Report and Order* is published in the Federal Register to receive continued consideration.

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<sup>2</sup> Operations outside the United States are subject to the regulatory requirements of those countries in which these systems may seek to operate.

<sup>3</sup> In this document, the terms "system proponents" or "system operators" refer to all parties seeking access to 2 GHz MSS spectrum, and the term "proposals" refers to their collective requests currently pending at the Commission; the terms "applicant" and "application" refer to those parties seeking to operate U.S.-licensed systems and their formal request; the terms "letter of intent (LOI) filer" and "LOI" refer to those non-U.S. licensed systems seeking to serve the U.S. market using 2 GHz MSS spectrum, and their formal request. Non-U.S.-licensed satellite systems, or LOI filers, seeking future access to U.S. spectrum may request, through a letter of intent, that the Commission "reserve" spectrum for the system when adopting service rules in anticipation of earth station applications to be filed in the future to access the non-U.S.-licensed satellite system. *See Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, IB Docket No. 96-111, Report and Order, 12 FCC Rcd 24094, 24173-74 ¶ 185 (1997) (*DISCO II Order*) (detailed discussion of the procedures under which foreign-licensed satellite systems may provide service in the United States).

<sup>4</sup> Application of The Boeing Company, File Nos. 179-SAT-P/LA-97(16) and 90-SAT-AMEND-98(20); IBFS File Nos. SAT-LOA-19970926-00149 and SAT-AMD-19980318-00021 (Boeing 2 GHz MSS Application); Application of Celsat America, Inc., File Nos. 26/27/28-DSS-P-94, 36-SAT-AMEND-95, 65/66/67-SAT-AMEND-96, 192-SAT-AMEND-97, and 88-SAT-AMEND-98; IBFS Nos. SAT-A/O-19940408-00016/17/18, SAT-AMD-19941125-00089, SAT-AMD-19960124-00007/8/9, SAT-AMD-19970925-00124 and SAT-AMD-19980113-00009; Application of Constellation Communications, Inc., File No. 181-SAT-P/LA-97(46); IBFS File Nos. SAT-LAO-19970926-00148 and SAT-AMD-19991230-00134 (Constellation 2 GHz MSS Application); Application of Globalstar, L.P., File Nos. 183 through 186-SAT-P/LA-97 and 182-SAT-P/LA-97(64); IBFS File Nos. SAT-LOA-19970926-00151 through SAT-LOA-19970926-00156 (Globalstar 2 GHz MSS Application); Application of Iridium LLC, File No. 187-SAT-P/LA-97(96); IBFS File No. SAT-LOA-19970926-00147; Application of Mobile Communications Holdings, Inc., File No. 180-SAT-P/LA-97(26); IBFS File No. SAT-LOA-19970926-00150 (MCHI 2 GHz MSS Application).

<sup>5</sup> Letter of Intent of ICO Services Limited, File No. 188-SAT-LOI-97; IBFS File No. SAT-LOI-19970926-00163; Letter of Intent of Inmarsat Horizons, File No. 190-SAT-LOI-97; IBFS File No. SAT-LOI-19970924-00098; Letter of Intent of TMI Communications and Company, Limited Partnership, File No. 189-SAT-LOI-97; IBFS File No. SAT-LOI-19970926-00161 (TMI 2 GHz MSS LOI).

## II. BACKGROUND

3. The 1992 World Administrative Radio Conference (WARC-92) allocated the 1800-2010 MHz and 2170-2200 MHz bands to MSS worldwide, and the 2165-2170 MHz band to MSS in Region 2,<sup>6</sup> each on a co-primary basis with fixed and mobile services, effective January 1, 2000.<sup>7</sup> The 1995 World Radiocommunication Conference (WRC-95) allocated the 2010-2025 MHz band to MSS in Region 2, effective January 1, 2005.<sup>8</sup> A footnote to this allocation provides that the 2010-2025 MHz band will be usable by MSS in the United States and Canada, effective January 1, 2000.<sup>9</sup> In 1997, the Commission reallocated the 1990-2025 MHz (uplink) and 2165-2200 MHz (downlink) bands to MSS in the United States, effective January 1, 2000.<sup>10</sup>

4. In a Notice of Proposed Rulemaking (*Notice*) released on March 25, 1999, we proposed licensing and service rules governing operation of 2 GHz MSS systems.<sup>11</sup> To accomplish our goal of expediting licensing of 2 GHz MSS systems, we sought comment on spectrum assignment options that would permit the authorization of all qualified 2 GHz MSS system proponents.<sup>12</sup> To integrate our service rules for MSS systems, we proposed to amend the existing MSS Above 1 GHz (Big LEO) service rules to incorporate service rules for the 2 GHz MSS.<sup>13</sup> We sought comment on earth station licensing proposals,

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<sup>6</sup> The world is divided into three Regions by agreement of the Members of the International Telecommunication Union (ITU). Generally, Region 1 includes Africa, Europe, Northern and Western portions of Asia; Region 2 includes the Americas and Greenland; and Region 3 includes Southern portions of Asia, Australia and the South Pacific. See ITU Radio Regulations Article S5, Section I.

<sup>7</sup> See Final Acts of the 1992 World Administrative Radio Conference, Malaga-Torremolinos (1992). A service designated as primary in a particular band enjoys priority status to operate in that band. A service designated as co-primary shares the band with other services given co-primary status on a co-equal basis. A service designated as secondary may operate in a particular band only to the extent that it does not cause harmful interference to any primary or co-primary designated service. See generally 47 C.F.R. § 2.105(c).

<sup>8</sup> See Final Acts of the 1995 World Radiocommunication Conference, Geneva (1995).

<sup>9</sup> See ITU Radio Regulations S5.444A.

<sup>10</sup> See *Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service*, ET Docket No. 95-18, First Report and Order and Further Notice of Proposed Rule Making, 12 FCC Rcd 7388, 7393-95 ¶¶ 10-15 (1997) (*2 GHz MSS Allocation Order*) (international allocation of portions of the 2 GHz frequency band for mobile satellite service links adopted for use in the United States), *on recon.*, Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order, 13 FCC Rcd 23949 (1998) (affirming 2 GHz MSS allocation and seeking further comment on relocation issues) (*2 GHz Relocation Third NPRM*). The 1980-1990 MHz portion of the international 2 GHz MSS allocation was allocated for domestic terrestrial mobile service use by Personal Communications Services (PCS) in 1994. *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314, Memorandum Opinion and Order, 9 FCC Rcd 4957 (1994).

<sup>11</sup> *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81, 14 FCC Rcd 4843 (1999) (*Notice*). In response to the *Notice*, 31 comments and 26 reply comments were filed, as well as numerous *ex parte* letters. A list of parties is attached as Appendix A.

<sup>12</sup> *Id.* at 4857-64 ¶¶ 26-48.

<sup>13</sup> *Id.* at 4874-89 ¶¶ 71-103. See generally *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands*, CC Docket No. 92-166, Report and Order, 9 FCC Rcd 5936 (1994) (*Big LEO Report & Order*), *on recon.*, Memorandum Opinion and Order, 11 FCC Rcd 12861 (1996) (*Big LEO Reconsideration*).

international coordination requirements, interservice sharing, and several other substantial issues.<sup>14</sup> In addition, we sought comment on specific incentives to encourage 2 GHz MSS operators to provide service to rural and unserved communities.<sup>15</sup>

5. In the *Notice*, we also reserved the option of adopting an alternative engineering solution or band sharing arrangement that would allow us to accommodate all qualified system proponents, including any hybrid solution arising from the proposed spectrum assignment alternatives.<sup>16</sup> On February 7, 2000, the International Bureau released a *Public Notice* seeking supplemental comments on authorizing the 2 GHz MSS systems using a processing alternative that combines elements of the options proposed in the *Notice*.<sup>17</sup> This additional band arrangement was intended to provide incentives for MSS operators to expedite implementation of their systems, while maximizing their operational flexibility during the incumbent relocation process.<sup>18</sup>

6. We recently finalized the incumbent relocation process for the 2 GHz MSS band.<sup>19</sup> The incumbent licensees in the 2 GHz MSS uplink band from 1990-2025 MHz are the broadcast auxiliary service, cable television relay service, and local television transmission service (collectively, "BAS").<sup>20</sup> Prior to the reallocation, BAS licensees were licensed to use seven channels of 17 or 18 megahertz each, spanning the 120 megahertz of spectrum from 1990 MHz to 2110 MHz (the "original BAS band").<sup>21</sup> In the reallocation of the 1990-2025 MHz band to 2 GHz MSS, the BAS band has been reduced from 120 megahertz to a total of 85 megahertz at 2025-2110 MHz (the "future BAS band"). In order to minimize the upfront relocation costs that 2 GHz MSS systems will pay, ensure that valuable spectrum does not lie fallow for several years, and allow advances in design and manufacture of new BAS equipment, we decided to adopt a two-phase BAS licensee relocation process.<sup>22</sup> Because the highly integrated nature of BAS nationwide makes isolated, link-by-link relocation infeasible, an entire BAS channel must be cleared nationwide before one 2 GHz MSS system can operate in that spectrum.<sup>23</sup> Thus, in Phase I, 2 GHz MSS operators will clear the lower 18 megahertz of the MSS uplink spectrum (1990-2008 MHz),

<sup>14</sup> *Notice*, 14 FCC Rcd at 4889-94 ¶¶ 104-119 (earth station licensing, international coordination, interservice sharing); *see also id.* at 4865-74 ¶¶ 49-70 (feeder links; tracking, telemetry, and command; inter-satellite links).

<sup>15</sup> *Notice*, 14 FCC Rcd at 4886-87 ¶ 95.

<sup>16</sup> *Id.* at 4858 ¶ 30.

<sup>17</sup> *International Bureau Requests Further Comment on Selected Issues Regarding Authorization of 2 GHz MSS Systems*, IB Docket No. 99-81, Public Notice, 15 FCC Rcd 2696 (Int'l Bur. 2000) (*Public Notice*). In response to the *Public Notice*, 13 supplemental comments were filed, as well as *ex parte* letters. *See* list of parties, Appendix A.

<sup>18</sup> *Id.*

<sup>19</sup> *See Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service*, ET Docket No. 95-18, Second Report And Order and Second Memorandum Opinion and Order, FCC 00-233 (rel. July 3, 2000) (*2 GHz Second R&O and Second MO&O*).

<sup>20</sup> *2 GHz MSS Allocation Order*, 12 FCC Rcd at 7396 ¶ 16.

<sup>21</sup> *See* 47 C.F.R. § 74.602. BAS licensees use these frequencies to relay news reports or other special events from remote locations to a broadcast station's main studio for on-air broadcast. Frequency coordinators at the news location coordinate use of the seven BAS channels among the BAS operators at the scene, which means that BAS operators might access any of the seven BAS channels on a moment's notice.

<sup>22</sup> *See 2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 35.

<sup>23</sup> *See id.* at ¶¶ 27, 62. *Accord* IUSG Supplemental Comments at 7 ("the first 2 GHz MSS entrant's efforts to make available even three or four megahertz of spectrum for its own use in the 2 GHz MSS uplink bands will require that all BAS licensee operations cease nationwide within the channel.").

primarily through BAS equipment retuning and filtering, narrowing the seven BAS channels to 14.5 or 15 megahertz each, occupying 2008-2110 MHz.<sup>24</sup> In Phase II, which will begin when the 18 megahertz of Phase I spectrum is no longer sufficient to meet 2 GHz MSS requirements, 2 GHz MSS operators will clear the upper 17 megahertz of the MSS uplink spectrum (2008-2025 MHz) by narrowing the seven BAS channels to approximately 12 megahertz each, at 2025-2110 MHz.<sup>25</sup>

7. The incumbent licensees in the 2 GHz MSS downlink band from 2165-2200 MHz are the commercial and private wireless fixed services ("FS").<sup>26</sup> Pursuant to the 2 GHz *Second R&O and Second MO&O*, MSS will relocate incumbent FS microwave licensees upon determination that unacceptable interference would be caused to the incumbent operations,<sup>27</sup> based on the standards set by the Telecommunications Industry Association (TIA) in its publication TSB86.<sup>28</sup> Should relocation of FS microwave licensees be necessary, the 2 GHz *Second R&O and Second MO&O* sets forth a relocation policy designed to allow early entry for new technology providers by allowing providers of new services to negotiate arrangements for reaccommodation of incumbent licensees, consistent with the policy established in the *Emerging Technologies Proceeding*, and refined in the *Microwave Relocation Proceeding*.<sup>29</sup>

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<sup>24</sup> 2 GHz *Second R&O and Second MO&O*, FCC 00-233, at ¶ 29. BAS equipment operating on channels of 17 or 18 megahertz width generally can be retuned and filtered to utilize narrower channels of 14.5 or 15 megahertz width. *Id.* at ¶ 67. The first 2 GHz MSS entrant must retune and filter (or replace, if necessary) the equipment of incumbent BAS licensees in the 30 largest television markets before beginning operations. After the first MSS entrant begins operations, it must retune BAS licensees' equipment in the next 70 largest markets within three years. Subsequent 2 GHz MSS entrants will be required to compensate the first 2 GHz MSS entrant on a *pro rata* basis. *Id.* at ¶ 71.

<sup>25</sup> *Id.* at ¶ 30. Phase II relocation likely will be costlier than Phase I, because the Phase II channel bandwidth is too narrow for current equipment design. Thus, new equipment will be required. *Id.* at ¶ 67.

<sup>26</sup> 2 GHz *MSS Allocation Order*, 12 FCC Rcd at 7402 ¶ 34. Specifically, the lower 15 megahertz of the MSS downlink spectrum (2165-2180 MHz) is used for common carrier purposes such as phone company microwave links, while the upper 20 megahertz of the MSS downlink spectrum (2180-2200 MHz) is used for private operational fixed services by railroads, pipelines, utilities, local governments, and public safety organizations.

<sup>27</sup> 2 GHz *Second R&O and Second MO&O*, FCC 00-233, at ¶ 78. Interference could be caused to fixed service microwave receivers by MSS satellites and to MSS handsets on the ground by microwave transmitters. *Id.* at ¶ 75.

<sup>28</sup> See Letter from G. Rosenblatt, TIA, to M. Salas, Federal Communications Commission (filed Nov. 11, 1999) (cover letter submitting TIA, *Criteria and Methodology to Assess Interference Between Systems in the Fixed Service and the Mobile-Satellite Service in the Band 2165-2200 MHz*, TSB86 (Telecommunications Industry Association 1999)). TSB86 was developed by a Joint Working Group comprised of the TIA Engineering Subcommittees on Spectrum and Orbit Utilization, the TIA Engineering Subcommittee on Interference Criteria for Microwave Systems, and the National Spectrum Managers Association. See *id.*

<sup>29</sup> See 2 GHz *Second R&O and Second MO&O*, FCC 00-233, at ¶¶ 75-102. See also *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third Notice of Proposed Rule Making, 7 FCC Rcd 6886 (1992); Second Report and Order, 8 FCC Rcd 6495 (1993); Third Report and Order and Memorandum Opinion and Order, 8 FCC Rcd 6589 (1993); Memorandum Opinion and Order, 9 FCC Rcd 1943 (1994); Second Memorandum Opinion and Order, 9 FCC Rcd 7797 (1994), *aff'd*, *Association of Public Safety Communications Officials-Int'l Inc. v. FCC*, 76 F.3d 395 (D.C. Cir. 1996) (*Emerging Technologies Proceeding*); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rule Making, 11 FCC Rcd 8825, 8837-38 ¶¶ 20-22 (1996); Second Report and Order, 12 FCC Rcd 2705 (1997);

### III. DISCUSSION

#### A. Service Link Licensing Procedures

##### 1. Spectrum Sharing Plan

##### a. Spectrum Authorization Methodologies Proposed in the *Notice* and Alternatives Considered

8. In the *Notice*, we sought comment on four spectrum authorization methodologies that could accommodate all proposed 2 GHz MSS systems.<sup>30</sup> The first is a “flexible band arrangement,” in which the Commission would grant each proposed system 2.5 megahertz in uplink and downlink spectrum, group systems into segments based on modulation technology (*i.e.*, code division multiple access (CDMA) or time division multiple access (TDMA)) and orbital geometry (*i.e.*, non-geostationary orbit (NGSO) or geostationary orbit (GSO)), and provide expansion spectrum between the assigned segments for additional system requirements.<sup>31</sup> In the second option, called the “negotiated entry” approach, the Commission would license all proposed systems across the entire band and allow the operators themselves to coordinate their operations; the Commission would be available to resolve disputes.<sup>32</sup> In the third proposal, the “traditional band arrangement,” the Commission would assign or designate equal spectrum blocks to the proposed systems using system design as a function of spectrum allocation (*i.e.*, a CDMA-NGSO block, a TDMA-GSO block, etc.).<sup>33</sup> Under the fourth proposal, the Commission would auction the spectrum in the event that none of the preceding three options is viable.<sup>34</sup> Two additional alternatives arose in the comments filed in response to the *Notice*: ICO USA Service Group (IUSG) offers a variation of negotiated entry it calls the “ICO Negotiated Entry Arrangement (INEA),” and Globalstar proposes an “all shared band arrangement.”

9. IUSG designed the INEA plan primarily to facilitate cost-effective relocation of the terrestrial incumbents, assuming that MSS operators would clear only as much spectrum as necessary for new operators to commence service on a rolling basis.<sup>35</sup> Under the INEA plan, early entrants would be permitted to operate anywhere in the bands, subject to negotiation and coordination with later arrivals that have filed a request for ITU coordination, met the Commission’s milestones, signed an unconditional launch contract, and are within one year of launch. In addition, the INEA plan would guarantee spectrum for later entrants through good faith intersystem coordination and dispute resolution mechanisms.<sup>36</sup> Commenters supporting the INEA argue that it accounts for divergent service implementation timetables,<sup>37</sup> and addresses international coordination concerns.<sup>38</sup> Commenters opposing INEA argue

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*Memorandum Opinion and Order on Reconsideration*, FCC 00-123 (released July 19, 2000) (*Microwave Relocation Proceeding*).

<sup>30</sup> *Notice*, 14 FCC Rcd at 4857-64 ¶¶ 26-48.

<sup>31</sup> *Id.* at 4858-61 ¶¶ 31-39.

<sup>32</sup> *Id.* at 4861-62 ¶¶ 40-43.

<sup>33</sup> *Id.* at 4863 ¶¶ 44-45.

<sup>34</sup> *Id.* at 4863-64 ¶¶ 46-48.

<sup>35</sup> ICO Comments at 6; IUSG Comments at 1 & Reply at 16-17; European Union/Delegation of the European Commission (EC) Comments at 4.

<sup>36</sup> IUSG Comments at 5-16 & Exhibit A (draft negotiation regulations).

<sup>37</sup> ICO Comments at 1; EC Comments at 1-2.

that early entrants can anti-competitively delay coordination negotiations with subsequent entrants, and that the lack of a guaranteed spectrum assignment would disadvantage later entrants, making it difficult to obtain financing.<sup>39</sup> To address some of these criticisms, IUSG revised the INEA in its reply comments. Under the revised INEA plan, if negotiations between MSS entrants prove unsuccessful, the earlier entrant would be required to relinquish 2.5 megahertz of cleared spectrum to the later entrant, subject to cost-sharing reimbursement.<sup>40</sup>

10. Globalstar calls its “all shared band arrangement” an “engineered solution” for assigning spectrum.<sup>41</sup> Globalstar believes all systems should be authorized across the available spectrum and share all the spectrum based on mutual agreement regarding basic system parameters.<sup>42</sup> Before any system begins service, all systems would adopt a sharing architecture, and as each system becomes ready to initiate service, all operational systems would be required to coordinate with the new system pursuant to the pre-negotiated sharing design.<sup>43</sup> Globalstar adds that no system should be assigned exclusive spectrum unless it can convince other systems that it should receive exclusive frequencies prior to any system being licensed.<sup>44</sup> At a minimum, Globalstar asks the Commission to assign spectrum to those systems that are capable of sharing in a separate segment of the band from those that cannot share spectrum.<sup>45</sup> Globalstar contends that its “all shared band” is the superior proposal as it would increase the potential for competition by authorizing all applicants, facilitate international coordination by giving global systems more flexibility to obtain spectrum assignments from other administrations, provide certainty by ensuring that each system can use the entire spectrum to maximum capability, and discourage warehousing because delay increases the complexity of entry coordination.<sup>46</sup> Alternatively, Globalstar proposes a hybrid plan under which the Commission would allow any system to operate anywhere within the band until a date certain, for instance, January 1, 2005, when a four-way band

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<sup>38</sup> IUSG Comments at 23-25 & Reply at 12-13.

<sup>39</sup> See Celsat Reply at 14-18; Constellation Reply at 5; Globalstar Reply at 5; MCHI Reply at 6 n.12. *But see* IUSG Comments at Exhibit B (attaching two letters from Wall Street institutions opining that the INEA proposal would not be a barrier to raising capital because the INEA safeguards guarantee licensees spectrum to commence operations).

<sup>40</sup> IUSG Reply at 5-8.

<sup>41</sup> Globalstar Comments at 9. Globalstar compares its all shared band arrangement to the one the Commission attempted in licensing the radiodetermination satellite service (RDSS), *id.* at 11 n.13, without acknowledging that no RDSS system ever launched, and the Commission reclaimed the RDSS spectrum for the Big LEO MSS systems.

<sup>42</sup> *Id.* at 11.

<sup>43</sup> *Id.* at 12 & n.14. MCHI supports some elements of Globalstar’s “all shared band arrangement,” but believes that the Commission need not adopt any band sharing agreement if the system proponents are required by regulation to discuss in good faith (1) adopting a band plan harmonized with Europe; (2) obtaining spectrum throughout the world; (3) exploring co-frequency sharing with different modulations; (4) adopting out-of-band emission standards; and (5) modifying system designs to facilitate sharing. MCHI Reply at 12-14.

<sup>44</sup> Globalstar Comments at 11. For example, Globalstar states that its studies “suggest that properly designed TDMA systems may well be able to share spectrum with other TDMA and CDMA systems.” *Id.* at 17. *But see* IUSG Reply at 32-33 (Globalstar’s “all shared” proposal is based on “unseen studies”).

<sup>45</sup> Globalstar Comments at 17, 20-21. *Accord* TMI Comments at 7 (Commission should permit sharing arrangements between operators).

<sup>46</sup> Globalstar Comments at 11-12 & Reply at 3-4.



division – NGSO shared, NGSO exclusive, GSO shared, GSO exclusive would take effect and all operational systems would be required to conform.<sup>47</sup>

11. ICO and Inmarsat oppose Globalstar's proposal. According to ICO, despite Globalstar's statement that the Commission should be "neutral toward the marketplace" and "let the marketplace decide which systems achieve greater demand for spectrum,"<sup>48</sup> Globalstar's "all shared" approach would force all operators to use CDMA technology.<sup>49</sup> In addition, ICO claims Globalstar's plan would delay 2 GHz MSS implementation because lengthy negotiations would result in order to come to agreement regarding the sharing technology.<sup>50</sup> According to Inmarsat, Globalstar's "all shared" proposal is contrary to ITU technical studies and would require all operators to modify their systems to share spectrum, contrary to Commission policy promoting innovation.<sup>51</sup>

12. Although none of the proposed band arrangements generated support from a majority of the commenters, all system proponents believe that the Commission can develop a technical sharing solution to accommodate all qualified system proponents.<sup>52</sup> In that regard, certain themes emerged: the Commission should (1) authorize a guaranteed minimum amount of spectrum,<sup>53</sup> (2) permit flexible spectrum use,<sup>54</sup> (3) allow flexibility not to choose any technology schemes prematurely,<sup>55</sup> (4) set a mechanism for systems to increase their amount of authorized spectrum when needed,<sup>56</sup> (5) provide

<sup>47</sup> Globalstar Comments at 21-22.

<sup>48</sup> Globalstar Reply at 7.

<sup>49</sup> ICO Reply at 17-19.

<sup>50</sup> *Id.* See also IUSG Reply at 32-33 (it is too late for ICO to alter its technology to CDMA, as would be necessary under Globalstar's plan); Iridium Reply at 15-16 (Globalstar's "all shared" proposal is too impractical to work effectively in the present environment of 2 GHz MSS applications).

<sup>51</sup> Inmarsat Reply at 4-7.

<sup>52</sup> See Constellation Reply at 1. See also Globalstar Comments at 12-14; ICO Comments at 5; MCHI Comments at 17; TMI Comments at 8.

<sup>53</sup> See Celsat Comments at 7-8 (benefit of flexible band arrangement); MCHI Comments at 5 (same). See also Boeing Comments at 21 (traditional band arrangement is the most attractive processing alternative because it is the most equitable in that it provides a minimum amount of guaranteed spectrum with the opportunity to later expand into unused or forfeited portions of the band); Constellation Comments at 13, 18 (same); MCHI Comments at 11 (same). But see IUSG Comments at 26-27 (guaranteed spectrum assignment not necessary to provide necessary certainty to permit confidence in system licenses for the purpose of financing).

<sup>54</sup> Even parties that oppose the proposed flexible band arrangement argue for more flexibility. See Constellation Comments at 11, 15 (flexible band arrangement is too rigid); Globalstar Comments at 17 (same); ICO Comments at 10-11 & Reply at 10, 14-15 (denies early entrants the ability to operate flexibly and economically); IUSG Comments at 28-31 & Reply at 21 (cannot accurately predict the needs of all systems). See also ICO Comments at 10-11 & Reply at 10 (traditional band arrangement is too rigid); Inmarsat Comments at 11 & Reply Comments at 3 (same); IUSG Comments at 29-31 & Reply at 28 (same).

<sup>55</sup> Constellation Comments at 11, 15; Globalstar Comments at 17; ICO Comments at 10-11 & Reply at 14-15; Inmarsat Comments at 5-6 (band plan should take new technological design developments into account); IUSG Comments at 28-31. IUSG urges the Commission not to segment the band by modulation schemes as technology may change and such a requirement would force applicants to elect a technology that may require submission of a major modification in the future to change the system. IUSG Comments at 20-22. Cf. Celsat Comments at 8 n.9 (requesting option of offering TDMA or CDMA service in its assigned segment).

<sup>56</sup> Celsat Comments at 7-8; Inmarsat Comments at 3; MCHI Comments at 5 & Reply at 9-10 (expressing preference for flexible band plan); TMI Comments at 5.

disincentives for warehousing,<sup>57</sup> (6) prevent anti-competitive conduct by early entrants,<sup>58</sup> (7) avoid lengthy inter-system coordination negotiations,<sup>59</sup> (8) ease international coordination,<sup>60</sup> and (9) facilitate cost-effective relocation of the terrestrial incumbents.<sup>61</sup> To further explore these themes, the International Bureau released a *Public Notice* on February 7, 2000, seeking supplemental comments on authorizing the 2 GHz MSS systems using a processing alternative that combines the leading ideas on the record.<sup>62</sup>

## **b. Orbit Considerations and Regional Spectrum**

13. The system proponents in this proceeding propose both NGSO and GSO mobile satellite systems.<sup>63</sup> Each type of system has technical advantages and disadvantages. For example, because NGSO satellites orbit close to the earth's surface, time delays during radio transmissions from the Earth to the satellite and back are shorter than for GSO systems. Conversely, because GSO satellites are at high altitudes, approximately 22,300 miles, a single GSO satellite has a very large potential coverage area, compared to a single NGSO satellite. Our goal is to provide an opportunity for both types of systems to compete in the marketplace to provide users with the best combination of services and prices.<sup>64</sup> We proposed, therefore, to authorize both NGSO and GSO MSS systems for operations in the 2

<sup>57</sup> Celsat Comments at 7-8; MCHI Comments at 5, 10-11; IUSG Comments at 33-34 & Reply at 28-29 (would invite warehousing of spectrum by "paper satellite" systems).

<sup>58</sup> Celsat, Constellation, Globalstar, Inmarsat, MCHI, and TMI all believe that early entrants could have the ability to delay entry of later entrants and, therefore, make it extremely difficult for later entrants to raise capital and to implement service. Celsat Comments at 16-17; Constellation Comments at 16-19; Globalstar Comments at 16, 18-19; Inmarsat Comments at 10-11; MCHI Comments at 5 n.12, 11-14; TMI Comments at 6-7. *See also* Celsat Comments at 9-12 (prevent the creation of "squatters rights"). *But see* IUSG Reply at 10-12 (all successful licensees to be accommodated once they are ready to provide service).

<sup>59</sup> ICO Comments at 10-11 & Reply at 11-12; MCHI Comments at 7-8 (adopt a good faith coordination standard); *but see* IUSG Reply at 23-24 (disputes over coordination could be contentious, delaying service).

<sup>60</sup> Inmarsat Comments at 4 (proposing spectrum assignments that would closely harmonize the Commission's band arrangement with the European 1.9/2.1 GHz MSS arrangement adopted by the European Radiocommunications Committee (ERC)); IUSG Reply at 22-23 & 29-30 (systems would require re-engineering, international re-coordination, and adjustments to the relocation scheme as system requirements change). MCHI states that the traditional approach would facilitate international coordination. MCHI Comments at 10-11. *See also* Celsat Comments at 14-16; Globalstar Comments at 16, 19; MCHI Comments at 5 n.12, 13-14.

<sup>61</sup> Of those commenters that addressed the relocation issue, most seek definitive action by the Commission to limit potential costs and to formulate rules to spread the costs equitably among the MSS licensees. Boeing Comments at 21-22 (advantage of the traditional arrangement is that relocation would be easier because each licensee would know what portion of the spectrum it is responsible for clearing); Celsat Comments at 9-12; IUSG Comments at 13-16, 20 n.45 & Reply at 26-27; TMI Comments at 4-6 (flexible arrangement does not address the relocation issue).

<sup>62</sup> *Public Notice*, 15 FCC Rcd 2696.

<sup>63</sup> We use the generic term NGSO to apply to low Earth orbit (LEO), medium Earth orbit (MEO), and highly elliptical orbit systems.

<sup>64</sup> As stated in the *Notice*, we limited eligibility to NGSO systems in the Big LEO proceeding because of a *de facto* limitation in other MSS bands to GSO services, a desire to foster LEO development, and to enhance consumer choice. *Notice*, 14 FCC Rcd at 4854 n.60 (citing *Big LEO Reconsideration*, 11 FCC Rcd at 12871 ¶ 29). We continue to believe that there is no reason to adopt a similar limitation in the 2 GHz frequency bands because there is adequate spectrum to accommodate both NGSO and GSO systems.

GHz MSS bands. The comments support our proposal to authorize both NGSO and GSO 2 GHz MSS systems.<sup>65</sup> Consequently, we will accommodate both types of systems in our band plan.

14. Another difference between the two types of satellite systems is that NGSO systems can provide complete and continuous global coverage, whereas, a single GSO satellite, while capable of providing continuous coverage, typically only can provide regional service. In the *Notice*, we explained that because a single GSO satellite is inherently restricted to serving a particular geographic area, GSO systems may be better suited for regional spectrum than NGSO systems.<sup>66</sup> At that time, we had tentatively concluded that the transition from the current BAS band to the future BAS band would take place simultaneously on a date certain.<sup>67</sup> We therefore assumed that the authorized 2 GHz MSS systems would have immediate access to any portion of the 2 GHz MSS uplink band (1990-2025 MHz). Thus, given that portions of the 2 GHz MSS spectrum allocation are not uniformly available throughout the world,<sup>68</sup> the flexible and traditional band arrangements proposed in the *Notice* grouped GSO systems in that portion of the 2 GHz band allocated for MSS only in Region 2 (*i.e.*, the 2010-2025 MHz uplink band and the 2165-2170 MHz downlink band) ("regional spectrum").<sup>69</sup>

15. The two-phase transition from the current BAS band to the future BAS band described in the *2 GHz Second R&O and Second MO&O*<sup>70</sup> requires us to revisit our assumptions about relocation, and develop a modified MSS authorization approach that will provide greater flexibility for MSS operators to implement service. Specifically, the lower 18 megahertz of the MSS uplink spectrum (1990-2008 MHz), which roughly aligns with that portion of the uplink band allocated for global operations (1990-2010 MHz), will be cleared first. Consequently, the upper 17 megahertz of the MSS uplink spectrum (2008-2025 MHz), and thus, the regional uplink spectrum (2010-2025 MHz), will be cleared at a later date. We expect that the first 2 GHz MSS systems launched, whether NGSO or GSO, may wish to begin operations in the spectrum cleared in the first phase of the relocation in the uplink portion of the band (1990-2008 MHz).<sup>71</sup> Though the *Notice* proposed to authorize NGSO and GSO systems in separate global and regional portions of the bands, based on the 2 GHz relocation policy we adopted since the *Notice*, we now do not believe it would be fair to prohibit GSO satellite operators from seeking access to the spectrum that is cleared in the first phase of the uplink relocation. Instead, we permit both GSO and NGSO system operators to use spectrum anywhere in the 2 GHz MSS bands. We believe that by

<sup>65</sup> Constellation Comments at 8; Globalstar Comments at 3; ICO Comments at 4; Inmarsat Comments at 8; TMI Comments at 3. *See also* Iridium Comments at 10.

<sup>66</sup> *See Notice*, 14 FCC Rcd at 4857-58 ¶ 28.

<sup>67</sup> *2 GHz Relocation Third NPRM*, 13 FCC Rcd at 23966 ¶ 39.

<sup>68</sup> *See supra* footnote 6 and accompanying text.

<sup>69</sup> *See Notice*, 14 FCC Rcd at 4857-58 ¶ 28. *See, e.g.*, Constellation Comments at 8 (group GSO systems primarily in that portion of the 2 GHz band allocated for MSS in Region 2); Celsat Comments at 6-7 & Reply at 6-7 (segment the 2 GHz spectrum into global and regional bands); TMI Comments at 4 (supports the segmentation of the band into regional and global spectrum as long as there are no undue relocation costs as a result); Boeing Supplemental Comments at 7-10 (assign regional systems to regional spectrum); IUSG Supplemental Comments at 8 *n.9* (confine GSO systems to regional spectrum). *Cf.* ICO Comments at 4-5 (limit the spectrum available to all GSO systems to an aggregate 10 MHz in either direction (2015-2025 MHz and 2165-2175 MHz); IUSG Comments at 7 (same). *But see* Celsat Reply at 7-8 (opposing the establishment of a GSO spectrum limitation).

<sup>70</sup> *See 2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶¶ 22-35; *see also* paragraph 6, *supra*.

<sup>71</sup> Of course, we will not prohibit 2 GHz MSS systems from operating in Phase II portion of the uplink band (2008-2025 MHz) if they are able to operate without causing interference to BAS licensees, *see* paragraph 24, *infra*, or are willing to escalate Phase II relocation.

eliminating distinctions between spectrum allocated for MSS in Region 2 and spectrum allocated for MSS globally, we are providing the most equitable mechanism for assigning the available spectrum in light of the incumbent relocation process. In addition, we expect that, because of differing regional spectrum assignments for MSS, many of the proposed systems may have to operate in different bands in different regions of the world, reducing the significance of any distinctions between regional and global 2 GHz MSS spectrum in the U.S. allocation.

**c. The 2 GHz MSS Band Arrangement**

16. We adopt a hybrid band arrangement that includes features of the various proposals in the record. Under this arrangement, first we divide the 2 GHz MSS uplink (1990-2025 MHz) and downlink (2165-2200 MHz) bands into distinct segments of equal bandwidth ("Selected Assignments") based on the number of system proponents at the time that we authorize the 2 GHz MSS systems, or the first of these systems, whichever occurs sooner.<sup>72</sup> We also will reserve an additional segment of spectrum equal to the other segments for expansion of system(s) by operators meeting certain criteria for service to unserved areas.<sup>73</sup> The band arrangement, including the segment reserved for service to unserved areas, can be described as follows:

$$35 \text{ megahertz} \div (\text{Number of System Proponents} + \text{One}) = \text{Total Size of Spectrum Segments.}$$

The segments will consist of adjacent blocks stretching from one end of the band to the other.<sup>74</sup> Each segment will represent an operator's potential selected spectrum assignment in each of the uplink and downlink bands. This arrangement is similar to the Traditional Band Arrangement proposal in the *Notice* in that we are dividing the spectrum into distinct segments for assignment. Unlike the Traditional Band Arrangement, however, we do not mandate a particular system orbit (that is, GSO or NGSO) for a given segment. Each 2 GHz MSS operator voluntarily will identify its selected spectrum at the time that the first satellite in its system reaches its intended orbit.<sup>75</sup> Operators must notify the Commission in writing regarding their Selected Assignment. The Commission staff will then issue a Public Notice to provide notification of the operator's selected segment. We adopt this arrangement to provide the certainty of a specific spectrum assignment that many commenters observed is critical to obtaining financing and thus ultimately to market success.

17. As the *Notice* explained, our experience has demonstrated that five megahertz of spectrum assigned to one system, 2.5 megahertz in either direction, is sufficient for commencement of service.<sup>76</sup> Under the band arrangement we adopt today, if all nine proponents are authorized, each system would choose Selected Assignments of 3.5 megahertz bandwidth in both the uplink and the downlink, with the remaining spectrum available for assignment based on service to unserved areas.<sup>77</sup> Several commenters supported our Flexible Band Arrangement in the *Notice* that would have provided for 2.5

<sup>72</sup> Based on the framework established in *DISCO II*, we will license U.S. systems and designate spectrum for foreign-licensed systems.

<sup>73</sup> See Section III.A.1.d., *infra*.

<sup>74</sup> For instance, if the Selected Assignments are 3.5 megahertz each, in the uplink portion of the band, the first Selected Assignment will begin at 1990 MHz and end at 1993.5 MHz. The second Selected Assignment will begin at 1993.5 MHz and end at 1997 MHz. The same segmentation will apply to the downlink portion of the band.

<sup>75</sup> A satellite's intended orbit is the orbit it will occupy to provide commercial service.

<sup>76</sup> *Notice*, 14 FCC Rcd at 4959 ¶ 34 (citing *Big LEO Report & Order*, 9 FCC Rcd at 5955 ¶ 44).

<sup>77</sup> That is, 35 megahertz of spectrum divided by nine system proponents plus one segment for assignment based on service to unserved areas would yield ten segments of 3.5 megahertz each.

megahertz of initial spectrum in both the uplink and downlink bands.<sup>78</sup> Still others favored our traditional band arrangement as a viable second choice because it offered a minimum amount of 3.75 megahertz of spectrum.<sup>79</sup> Thus, we believe that providing for 3.5 megahertz for each system is sufficient to commence operations. In addition, although we are hopeful that all proposed systems proceed toward authorization, it is possible that not all will do so before we first authorize a 2 GHz MSS system.<sup>80</sup> In such case, the remaining system proponents would receive more than 3.5 megahertz of spectrum upon authorization. For example, if at that time there are seven remaining proposals, each system authorized from that point would receive 4.375 megahertz of spectrum.<sup>81</sup>

18. Furthermore, as explained in the *Notice*, although we are hopeful that all authorized systems will be built, we recognize that this might not occur.<sup>82</sup> Thus, there is a probability that additional spectrum will become available as some authorized systems are not able to implement service. Spectrum abandoned by authorized systems may be available for expansion of systems that are operational and require additional spectrum. We do not, however, establish a policy or rule for redistribution of abandoned spectrum here. Instead, we will evaluate whether to redistribute such spectrum or make it available to new entrants after achievement of each of our system implementation milestones. We will also consider whether to designate abandoned spectrum for award to operators meeting our unserved area service criterion, described below.

19. In addition to authorizing each operational system to use a Selected Assignment, each operator may provide service anywhere else in the 2 GHz MSS spectrum on a secondary basis as to other MSS operators, with respect to the unoccupied spectrum assignments available for selection by other 2 GHz MSS operators. For example, one operator may utilize spectrum in another operator's selected spectrum, but must vacate that spectrum if the operator that has selected that spectrum wishes to occupy it. In addition, each operator may coordinate with any other 2 GHz MSS operator also seeking to use spectrum outside of its Selected Assignment. In that case, both such operators would operate on a secondary basis with respect to the system that has selected the spectrum. Thus, if two systems desire to operate on the same frequencies outside each of their Selected Assignments, neither has priority over the

<sup>78</sup> Celsat Comments at 7-8; Inmarsat Comments at 3; MCHI Comments at 5; TMI Comments at 5.

<sup>79</sup> Globalstar Comments at 21-22; MCHI Comments at 11; TMI Comments at 7. *Cf.* Celsat Comments at 13-14 (may provide enough spectrum if forfeited spectrum is reassigned to first round operators as expansion spectrum under Celsat's proposed expansion spectrum assignment rules).

<sup>80</sup> See Letter of F. Thomas Tuttle, Senior Vice President, Iridium LLC to Magalie Salas, Secretary, FCC, File No. 187-SAT-P/LA-97 (Sept. 13, 1999) (advising the Commission of the company's filing of a voluntary petition for reorganization under Chapter 11 of the Federal Bankruptcy Code); Constellation Comments at 25-26 ("[i]t will be very difficult for any system operator to finance two systems at the same time. . . . [F]ull [second] system construction is unlikely to begin until about three years prior to the end of the first generation system."). Compare Celsat Supplementary Comments at 2 n.3 (presuming that Inmarsat has abandoned its proposed 2 GHz MSS system) and MCHI Supplementary Comments at 2 n.5 (same) with Letter of Kelly Cameron, Inmarsat Counsel to Thomas Tycz, Chief, Satellite and Radiocommunications Division, International Bureau, FCC, File No. 190-SAT-LOI-97(4) (Jan. 28, 2000) (reporting the Inmarsat Board's decision that Project Horizons "is not appropriate to pursue at this time" yet "[d]espite this, Inmarsat remains interested in participating in the Commission's 2 GHz processing round."). See generally *American Telephone and Telegraph Co./Ford Aerospace Satellite Services Corp.*, Memorandum Opinion and Order, 2 FCC Rcd 4431, 4435 ¶ 29 (1987) (it is the Commission's policy not to consider applications that propose launch more than five years after grant).

<sup>81</sup> That is, 35 megahertz of spectrum divided by seven system proponents plus one segment for assignment based on service to unserved areas would yield eight segments of 4.375 megahertz each.

<sup>82</sup> *Notice*, 14 FCC Rcd 4858 ¶ 29.

other. If those operators cannot coordinate secondary spectrum use in the desired portion of secondary spectrum, then they both must vacate those frequencies and operate elsewhere. In other words, systems can claim priority use of only Selected Assignments, and must operate outside of selected spectrum subject to appropriate intersystem coordination.<sup>83</sup> The sharing aspects of this band arrangement are similar to the negotiated entry alternative proposed in the *Notice* in that operators will coordinate spectrum usage among themselves.<sup>84</sup> Operators using spectrum on a secondary basis must comply with all applicable incumbent relocation requirements before commencing service. Later entrants selecting spectrum as their Selected Assignment that has been cleared by an earlier entrant for secondary use will be required to reimburse the earlier entrant for relocation costs.

20. System operators will be required to comply with the rules adopted for negotiations with and transition of terrestrial incumbents in the 2 GHz MSS uplink and downlink bands.<sup>85</sup> Operators that intend to use spectrum designated as Phase II spectrum in the uplink portion of the band must comply with all negotiation periods and transition requirements, unless they can share the spectrum. We recognize that system proponents may not be able to predict the segment of the uplink band they intend to select until late in the implementation process. This could make negotiations with incumbents more difficult under the two-year time periods established for negotiations for Phase II spectrum and in the downlink portion of the band. We believe, however, that 2 GHz MSS operators will have sufficient incentives to conclude negotiations in order to begin service. In addition, we believe that it will become clear once 2 GHz MSS systems begin implementing which operators will be in Phase II spectrum and which portions of the downlink spectrum remain available for Selected Assignments.

21. We do not limit the amount of spectrum available to 2 GHz MSS operators on a secondary basis outside of their Selected Assignments. In order to limit the potential for strategic delays, such as those raised by commenters, system operators will be required to inform service providers and subscribers in writing that service provided using spectrum outside of the Selected Assignment is subject to preemption.<sup>86</sup> In the event that a later entrant selects spectrum for its Selected Assignment that is being used by an earlier entrant, the earlier entrant will be required to move to other available spectrum or return to its Selected Assignment.<sup>87</sup> This part of the arrangement is designed to allow MSS systems to begin providing service in any available frequencies during the incumbent transition process, to encourage use of spectrum, and to facilitate inter-system coordination in the band when later entrants begin operations.

22. The comments received in response to the February 7, 2000 *Public Notice* generally support this band arrangement with several commenters raising specific concerns or recommending minor modifications.<sup>88</sup> Many of the commenters express concern about the ability of operators to access

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<sup>83</sup> See paragraph 29, *infra*.

<sup>84</sup> *Notice*, 14 FCC Rcd 4861-62 at ¶ 40-43.

<sup>85</sup> 2 GHz Second R&O and Second MO&O, FCC 00-233, at ¶¶ 38-49, 83-90.

<sup>86</sup> For example, a 2 GHz MSS operator may operate solely in its Selected Assignment, entirely outside of its Selected Assignment (on a secondary basis), or partially in each.

<sup>87</sup> Operators will be required to vacate spectrum identified as a Selected Assignment by another operator within 30 days of receipt of a letter from the new entrant requesting the move. Operators requesting a move shall file a copy of the demand letter with the Commission.

<sup>88</sup> Boeing Supplemental Comments at 1; Celsat Supplemental Comments at 7; Constellation Supplemental Comments at 2; ICO Supplemental Comments at 2; Inmarsat Supplemental Comments at 2; Iridium Supplemental Comments at 2-3; IUSG Supplemental Comments at 2; MCHI Supplemental Comments at 3; TMI Supplemental Comments at 2.

spectrum beyond the amount assigned for each Selected Assignment by sharing with other operators or other means.<sup>89</sup> For similar reasons, several commenters urge us to adopt a policy that would redistribute spectrum obtained from abandoned or revoked authorizations to the remaining operators.<sup>90</sup> We agree that our licensing arrangement should maximize spectrum sharing efficiencies. We recognize that some technologies may benefit from spectrum sharing techniques. Therefore, we permit operators to aggregate Selected Assignments by reaching agreement for sharing of those assignments among themselves. For example, several CDMA operators could agree to select and operate in adjacent Selected Assignments and design their spectrum use to overlap each other. This feature balances the needs of operators capable of using overlapping frequencies with those of systems that may not be designed to share co-frequency by providing incentives for shared technology proponents to cooperate during system implementation.<sup>91</sup>

23. ICO and IUSG seek clarification as to whether our band arrangement will require operators to select paired Selected Assignments in the service link bands.<sup>92</sup> That is, whether we will pair uplink Selected Assignments with downlink Selected Assignments. We do not require operators to select paired assignments of spectrum in the service links. We permit operators to request segments that are independent of each other. We agree with IUSG that this approach could reduce the burden of incumbent transitions during the initial phases of MSS deployment.

24. Similarly, in discussing how our band arrangement could reduce incumbent transition costs, Celsat requests that we clarify our position with regard to 2 GHz MSS systems sharing spectrum with BAS in the 1990-2025 MHz band.<sup>93</sup> In the *2 GHz Second R&O and Second MO&O*, we generally applied our relocation policy in the *Emerging Technologies Proceeding* to the relocation obligations facing the 2 GHz MSS system proponents.<sup>94</sup> This policy permits new licensees that can share spectrum with incumbents to do so without incurring relocation obligations.<sup>95</sup> Therefore, if a particular 2 GHz MSS system proponent can demonstrate conclusively that its proposed system is capable of sharing

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<sup>89</sup> Celsat Supplemental Comments at 4 (operators should be permitted to occupy two blocks because not all applicants will implement); Constellation Supplemental Comments at 7-8 (Commission should permit certain systems using CDMA technology to operate over two selected assignments); ICO Supplemental Comments at 3 (allow use of spectrum beyond selected assignment on secondary basis); Inmarsat Supplemental Comments at 2 (allow some selected assignments to overlap if operators agree); IUSG Supplemental Comments at 5 (operators launching the first satellite should be able to use spectrum beyond the selected assignment on a secondary basis); MCHI Supplemental Comments at 6-8 (concerned that the band plan does not provide the type of spectrum efficiencies that the Traditional Band Approach employed through technology groupings).

<sup>90</sup> ICO Supplemental Comments at 4-5; Inmarsat Supplemental Comments at 3; Iridium Supplemental Comments at 3-4; IUSG Supplemental Comments at 6; and MCHI Supplemental Comments at 9-10.

<sup>91</sup> In order to be able to aggregate spectrum, system proponents capable of sharing may want to coordinate launch of the first satellites in each system to coordinate the selection of Selected Assignments.

<sup>92</sup> ICO Supplemental Comments at 6-7; IUSG Supplemental Comments at 7-8.

<sup>93</sup> Celsat Comments at 11 n.13.

<sup>94</sup> *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 63.

<sup>95</sup> “[W]e will encourage spectrum sharing between emerging technologies services and incumbent 2 GHz fixed microwave users whenever technically feasible. . . . We are hopeful, however, that spectrum sharing techniques for some services . . . may prove workable. The success of those techniques could allow co-primary operation of some emerging technologies with existing fixed microwave services on a non-interference basis without the need for any relocation agreements.” *Emerging Technologies Proceeding*, First Report and Order and Third Notice of Proposed Rule Making, 7 FCC Rcd at 6891 ¶ 29.

spectrum with all types of BAS operations in the 2 GHz band, that system will be exempt from relocation obligations.

25. Because an entire BAS channel must be cleared nationwide before an MSS system can operate in that spectrum, the first 2 GHz MSS system to begin service in that portion of the uplink will have to clear more spectrum than it will be authorized to use.<sup>96</sup> As a result, the first entrant will clear BAS spectrum for later entering systems. That operator is thus entitled to relocation cost reimbursement from those systems using the cleared BAS spectrum. It would be grossly unfair to allow a system claiming it can share spectrum with BAS to take advantage of spectrum cleared by an earlier entrant. If that system can share with BAS to avoid relocation obligations, it must do so. Therefore, a 2 GHz MSS operator will be exempt from relocation obligations only if it chooses its Selected Assignment in an uncleared portion of the band. Furthermore, to maintain its relocation exemption, this 2 GHz MSS operator may not operate on a secondary basis in spectrum outside of its Selected Assignment that has been cleared by earlier entrants. For example, assuming the Phase I spectrum has been cleared, the 2 GHz MSS operator claiming it can share with BAS must choose its Selected Assignment in the Phase II portion of the band, and only operate in the Phase II portion of the band. If the system, once operational, discovers that it cannot share with BAS, or otherwise desires to operate in cleared spectrum in Phase I, it may do so, subject to compliance with the relocation procedures established in our relocation order.

26. The only system opposing the band approach proposed in the *Public Notice*, Globalstar, reiterates its recommendation that we adopt its "all shared" band arrangement. Under that arrangement, immediately upon licensing all eligible systems would share the entire available 2 GHz MSS spectrum through coordination. Globalstar's "all shared" band arrangement is premised on completion of coordination among all eligible 2 GHz MSS operators.<sup>97</sup> Globalstar admits in its comments, however, that "[n]egotiations do not always succeed, or can drag on for years."<sup>98</sup> We agree with Globalstar on that point and are concerned that if we were to adopt its proposal, deployment of all 2 GHz MSS systems could be delayed indefinitely. Such delay would significantly compromise our objective of expediting the delivery of 2 GHz MSS service to consumers. We also are troubled by the prerequisite under Globalstar's proposal that would potentially require the Commission to mandate that all 2 GHz MSS operators use the same technology or to coordinate (e.g., modulation schemes) in order to facilitate co-frequency sharing among the 2 GHz MSS providers.<sup>99</sup> It has been our policy to allow licensees to optimize system designs within our regulatory framework in order to promote innovation.<sup>100</sup> Given that most of the 2 GHz MSS proponents, including Globalstar, have not committed to implementing a particular technology, we find no justification for adopting Globalstar's proposal and believe that the band arrangement adopted here best addresses the various system proposals.<sup>101</sup>

27. We also recognize, as stated by Globalstar, the ITU International Mobile Telecommunications for the Year 2000 ("IMT-2000") Project's progress on standardization of personal communication services technologies and its relevance to the MSS industry. All but one of the IMT-2000 radio transmission technologies can be implemented within 3.5 megahertz of selected

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<sup>96</sup> 2 GHz Second R&O and Second MO&O, FCC 00-233, at ¶ 62.

<sup>97</sup> Globalstar Supplemental Comments at 16.

<sup>98</sup> *Id.* at 19-20.

<sup>99</sup> *Id.* at 14.

<sup>100</sup> 47 U.S.C. § 157(a) ("It shall be the policy of the United States to encourage the provision of new technologies and services to the public.")

<sup>101</sup> Globalstar Supplemental Comments at 10 n.5.



spectrum. The implementation of IMT-DS (Wideband CDMA) requires more spectrum than may be available to a single operator under our band approach. The band approach we adopt today, however, provides sufficient flexibility for operators convinced of the efficiencies of using Wideband CDMA in shared spectrum to use spectrum outside of their Selected Assignment on a secondary basis or aggregate their spectrum assignments.

28. Several commenters raise other concerns about our band arrangement in their supplemental comments. Inmarsat suggests that authorized systems be entitled to select spectrum six months before launch to allow sufficient time to finalize plans and procedures for in-orbit testing.<sup>102</sup> We are not convinced by Inmarsat's assertion. We do not believe that launch dates are reliable deadlines. For instance, launch dates for any type of satellite – GSO or NGSO – can be delayed indefinitely or cancelled. TMI contends that triggering spectrum selection at the time of launch of a system's first satellite would disadvantage GSOs, as compared to NGSOs, because it takes longer to build and launch GSO satellites.<sup>103</sup> It is accurate that construction and launch of GSO satellites typically takes longer than that of individual NGSO satellites. On balance, however, we believe it is best to allow spectrum selection at the time the first satellite in a system reaches its intended orbit. It is at that moment that a 2 GHz MSS satellite system will need to identify spectrum and begin to operate there. In addition, though NGSO systems usually can be built faster, they require more launches to implement a constellation and conditions often vary and, thus, it is not certain what systems will be the first to be deployed. Moreover, allowing the first system that launches to select its spectrum, and each subsequent system to do so sequentially provides market-based incentives to launch systems. Thus, this approach furthers the Commission's strong policies favoring competition, efficient use of spectrum resources and quick deployment of services for the benefit of U.S. consumers.

29. MCHI raises the concern that operators may resort to "gaming" under our band arrangement by selecting an assignment based on its value to another applicant and requests that the Commission be prepared to address such problems on an *ad hoc* basis.<sup>104</sup> We do not intend to intervene unless the parties are unable to resolve an issue after first attempting to negotiate in good faith. We will be available to address specific concerns if an operator presents sufficient evidence to demonstrate that another operator has violated our rules. TMI raises a similar concern about preventing "squatting" by early entrants that use spectrum outside of their selected assignment on a secondary basis.<sup>105</sup> We address the potential for early entrants to abuse their negotiating position with later entrants by only allowing secondary use of spectrum outside of the Selected Assignment and requiring written notice to service providers and subscribers that service can be preempted.<sup>106</sup> Furthermore, we will enforce our rules if the need arises.

30. We adopt the band arrangement discussed above for assignment of the 2 GHz MSS spectrum to accommodate all proposed systems with adequate spectrum to launch service, and thus, we resolve mutual exclusivity among the system proponents.<sup>107</sup> This approach, which essentially consists of

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<sup>102</sup> Inmarsat Supplementary Comments at 2-3.

<sup>103</sup> TMI Supplemental Comments at 2-3.

<sup>104</sup> MCHI Supplemental Comments at 8-9.

<sup>105</sup> TMI Supplementary Comments at 2.

<sup>106</sup> Celsat Supplementary Comments at 4-5. *See* paragraph 19, *supra*.

<sup>107</sup> Our decision to forge a band arrangement that avoids mutual exclusivity by accommodating all 2 GHz MSS system proponents moots our consideration of competitive bidding as a method of authorizing the 2 GHz MSS system proponents. For the same reason, we do not address the Open-Market Reorganization for the Betterment of

a combination of our Traditional Band Arrangement and Negotiated Entry Approach, provides certainty for qualified operators to pursue financing and design systems. At the same time, it provides sufficient flexibility to maximize the use of the 2 GHz MSS spectrum and minimize the burdens of incumbent relocation. In addition, the band arrangement adopted here promotes our goals of encouraging technical innovation, facilitating deployment of service, maximizing the efficient use of spectrum, and using market-based incentives.

**d. Service to Unserved Areas**

31. Section 151 of the Communications Act mandates that the Commission “make available, so far as possible, to all the people of United States without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges . . . .”<sup>108</sup> In fulfilling this mandate, the Commission has had a long history of encouraging the deployment of basic and advanced telecommunications services to all U.S. consumers throughout the entire United States and associated geographic areas. For example, in 1994 in the *Big LEO Report & Order*, the Commission explained that the “new mobile satellite service [Big LEO] will offer Americans in rural areas that are not otherwise linked to the communications infrastructure immediate access to a feature-rich communications network.”<sup>109</sup> On August 5, 1999, this Commission commenced two additional proceedings intended to foster the delivery of telecommunications services, including satellite services, to unserved areas.<sup>110</sup> On June 8, 2000, we adopted the first two Orders arising from these proceedings.<sup>111</sup>

32. We believe that access to telecommunications services is essential to ensuring that persons residing in unserved or geographically isolated areas are able to participate in today’s fast-

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International Telecommunications Act (ORBIT Act), enacted after release of the *Notice*. See Pub. L. No. 106-180, § 3, 114 Stat. 48 (2000) (adding Section 647 to the Communications Satellite Act of 1962, 47 U.S.C. § 701 *et seq.*).

<sup>108</sup> 47 U.S.C. § 151.

<sup>109</sup> *Big LEO Report & Order*, 9 FCC Rcd at 5940 ¶ 3.

<sup>110</sup> First, in a Federal-State Joint Board on Universal Service Further Notice of Proposed Rulemaking, we sought comment on the availability of, and possible impediments to, deployment and subscribership in unserved and underserved areas of the Nation, including for satellite services. *Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, CC Docket No. 96-45, Further Notice of Proposed Rulemaking, 14 FCC Rcd 21177 (1999). We also sought comment on a range of possible modifications to the high-cost, low-income and rural health care support mechanisms that are designed to promote deployment and subscribership in these areas. Second, in a separate Notice of Proposed Rulemaking addressing wireless and satellite technologies specifically, we sought comment on any policies that we could adopt, or regulations that we should eliminate or streamline, including for satellite services, to promote the deployment of services in tribal lands and other unserved areas. *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Notice of Proposed Rulemaking, 14 FCC Rcd 13679 (1999). The Commission has recently imposed conditions on the merged SBC Communications Inc. (SBC) – Ameritech Corporation (Ameritech) entity to promote service to rural and unserved areas. We are requiring that at least ten percent of all rural/urban wire centers where the merged entity’s xDSL separate affiliate provides service be low-income rural/urban centers. Summary of SBC/Ameritech Conditions, [http://www.fcc.gov/Bureaus/Common\\_Carrier/News\\_Releases/1999/nrc9077a.html](http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrc9077a.html).

<sup>111</sup> *Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, CC Docket No. 96-45, Twelfth Report and Order, Memorandum Opinion And Order, and Further Notice of Proposed Rulemaking, FCC 00-208 (rel. June 30, 2000) (*Universal Service Twelfth R&O*); *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Report and Order and Further Notice of Proposed Rule Making, FCC 00-209 (rel. June 30, 2000) (*Wireless Tribal Order*).

changing information economy. If access is not provided, persons residing in these areas will have less opportunity to seek or access educational, medical, economic or other important resources. As we stated in the *Notice*, we believe satellites are an excellent technology for delivering basic and advanced telecommunication services to unserved, rural, insular or economically isolated areas, including Native American communities, Alaska, Hawaii, and Puerto Rico, and U.S. territories and possessions such as communities within the U.S. Virgin Islands, Guam and American Samoa ("unserved areas").<sup>112</sup> In the *Notice*, we sought guidance as to the policies or rules we could implement (or forbear from) to encourage provision of 2 GHz MSS to unserved areas. For example, we asked whether one criterion for awarding expansion spectrum and resolving coordination disputes should be whether a licensee is providing service to unserved areas.<sup>113</sup> We noted that we have thus far not adopted such policies or rules for Big LEO licensees or other MSS providers. We therefore sought comment on whether we should, in a separate proceeding, adopt similar policies or rules for unserved areas for Big LEO and other satellite licensees.

33. We remain committed to encouraging the expeditious delivery of telecommunications services, via satellite services, to unserved communities. The comments in this proceeding support our belief that satellites are an excellent technology for delivering these services.<sup>114</sup> Indeed, the record shows that many of the 2 GHz MSS system proponents claim that providing service to unserved and rural areas is a major part of their business plans.<sup>115</sup> For example, Celsat explains that it envisions being able to bring service to these communities for as little as eight cents per minute, including long-distance voice telephony service.<sup>116</sup> Celsat agrees with our proposal to award expansion spectrum based on providing service to unserved areas as an incentive to provide such service.<sup>117</sup> Moreover, ICO states that its technology and business plan are uniquely suited to serving remote areas.<sup>118</sup>

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<sup>112</sup> *Notice*, 14 FCC Rcd at 4886-87 ¶ 95.

<sup>113</sup> *Id.*

<sup>114</sup> Boeing Comments at 16-18; Celsat Comments at 28; Constellation Comments at 28; Globalstar Comments at 44; ICO Comments at 19; IUSG Comments at 44; Iridium Comments at 41; MCHI Comments at 26; Satellite Industry Association (SIA) Comments at 2-3. We also received comments from two very small aperture terminal (VSAT) providers. Both of the VSAT commenters agree that satellites are an excellent technology for providing telecommunications services to unserved areas. STM Wireless, Inc. (STM) argues that MSS systems may not be an efficient technology for providing service to these areas. *Ex Parte* Letter of STM Wireless, Inc. (dated July 13, 1999) (explaining that STM is currently using the latest VSAT technologies to successfully serve these markets for 10-15 cents per minute for voice telephone service to anywhere in the United States). The other VSAT commenter, Titan Wireless (Titan), requests Commission support in various regulatory areas. Titan seeks assistance in the areas of interconnection with the PSTN, access to Universal Service Funds, coordination of space segment frequency and expeditious licensing of earth stations, and availability of extended C-band frequencies to make it easier for VSAT operators to provide service in these unserved areas. Titan Reply Comments at 2-4. These issues are outside the context of this proceeding and will be considered in other rulemakings.

<sup>115</sup> Constellation 2 GHz MSS Application at 13; MCHI 2 GHz MSS Application, Exhibit 2: Market Information; Globalstar 2 GHz MSS Application at 52-3; *Ex Parte* Letter of Eagle River Investments, LLC, and ICO Global Communications (dated March 17, 2000) (Eagle River/ICO *Ex Parte* Letter); Celsat Consolidated Replies and Opposition at 2 (filed June 3, 1998).

<sup>116</sup> Celsat Comments at 28.

<sup>117</sup> *Id.* at 29.

<sup>118</sup> Eagle River/ICO *Ex Parte* Letter at 1.

34. We agree with the commenters who state that satellites are an excellent method for quickly extending basic and advanced telecommunications services to rural and unserved areas. We believe that the incentives we adopt below are an efficient method for deploying service in unserved areas. We find that it is more appropriate to create a spectrum-based incentive mechanism, rather than to adopt specific and detailed requirements, as an efficient means to more closely approximate a market-based mechanism for ensuring that unserved areas receive needed services in a timely manner. In other words, firms that choose to deploy service to unserved areas will obtain additional guaranteed spectrum as a result of providing such service, but will have the option of choosing not to deploy such service and therefore not avail themselves of the opportunity to obtain additional guaranteed spectrum.

35. Therefore, we will make available a separate segment of spectrum for assignment as expansion spectrum in both the uplink and the downlink portions of the service band. In the Flexible Band Arrangement section in the *Notice*, we proposed the concept of expansion spectrum by which additional spectrum would be assigned to an entity when it demonstrated that its commercial operations were exceeding the capacity of its original spectrum assignment.<sup>119</sup> The expansion spectrum as adopted here will be available to authorized 2 GHz MSS systems that first demonstrate they will offer MSS *capacity* directed at providing service to consumers in unserved areas. Authorized systems will be eligible for the expansion spectrum whether or not they are operational. The expansion segment will be available in any assignment available for selection in the Phase I portion of the uplink band (1990-2008 MHz), as long as sufficient spectrum remains available to accommodate at least one additional entrant. If there is not sufficient spectrum to accommodate an additional authorized system in the Phase I spectrum, the expansion spectrum will be located in the Phase II portion of the uplink band (2008-2025 MHz). The expansion spectrum will be available in any assignment available for selection in the downlink portion of the MSS spectrum (2165-2200 MHz) that has not already been selected.

36. In order to be eligible for assignment of the expansion spectrum, authorized 2 GHz MSS systems must demonstrate that at least ten percent of their contracted U.S. capacity is committed to service providers that offer 2 GHz MSS services in unserved or rural service areas. For purposes of this incentive, we will adopt as the definition of unserved area any area falling within a Rural Service Area (RSA).<sup>120</sup> RSAs closely fit the unserved areas we identified as areas that could most benefit from 2 GHz MSS in the *Notice*, and provide a well-established geographic designation. We will determine the amount of unserved or rural capacity contributed by each individual capacity contract by multiplying the total amount of capacity covered by that contract by the percentage of the relevant retail carrier's service area that falls within an RSA. We will then add up the aggregate amount of rural capacity provided by all contracts and divide that figure by the total amount of the 2 GHz provider's contracted-for capacity.<sup>121</sup>

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<sup>119</sup> *Notice*, 14 FCC Rcd at 4859 ¶ 33.

<sup>120</sup> RSAs are 428 areas, other than Metropolitan Statistical Areas (MSAs), established by the Commission for the purposes of defining cellular markets. See 47 C.F.R. § 22.909. The 428 RSAs, and the counties they comprise, are listed in Public Notice, Report No. CL-92-40, DA 92-109, 7 FCC Rcd 742, 762-97 (1992).

<sup>121</sup> An authorized 2 GHz MSS system seeking expansion spectrum must submit all capacity measurements (e.g., minutes, megabits per second) in a uniform measurement when aggregating capacity. For example, satellite operator A enters into capacity contracts with retail service providers B and C for 10 million minutes each. Satellite operator A does not have any other contracts. B's retail footprint extends 20% into RSAs. Multiplying 10 million minutes by 20% yields 2 million minutes attributable to RSA coverage. C's retail footprint extends 7% into RSAs. Multiplying 10 million minutes by 7% yields 700,000 minutes. Aggregating B and C's attributable RSA minutes sums to 2.7 million minutes. Dividing the aggregate of B and C's RSA minutes by the total contracted-capacity of 20 million minutes produces a 13.5% attributable RSA contracted-capacity for satellite operator A. A qualifies for rural spectrum as it has met the 10% threshold.

37. We believe that ten percent of an authorized 2 GHz MSS system's contracted U.S. capacity represents a reasonable approximation of the capacity that is necessary to provide meaningful service to unserved areas. RSAs cover approximately 20 percent of the U.S. population, a significant percentage of potential subscribers.<sup>122</sup> Thus, we believe that a ten percent RSA contracted-capacity service offering incentive is an appropriate and reasonable voluntary incentive that would not create an undue burden on operators. We also note that the spectrum available for expansion is optional, and is merely available as an incentive for those interested in providing service to unserved areas.

38. Authorized 2 GHz MSS systems that seek to establish eligibility for the expansion spectrum must submit copies of service contracts evidencing such eligibility. To maximize the opportunity for all 2 GHz MSS operators to obtain service contracts, we will accept requests for expansion spectrum beginning one year from the date the first 2 GHz MSS system is authorized. When a request for the expansion spectrum is filed, Commission staff will issue a Public Notice announcing that the Commission is accepting competing requests for the expansion spectrum from authorized 2 GHz MSS systems. As stated above, authorized 2 GHz MSS systems do not have to be operational to qualify for the expansion spectrum. Once the deadline for requests closes, we will evaluate the requests based on the criterion described above, and issue an order assigning or designating the spectrum to those authorized 2 GHz MSS systems meeting or exceeding the criterion. A successful entity for expansion spectrum will be required to contribute all applicable incumbent relocation costs under our incumbent relocation rules and the 2 GHz MSS band arrangement adopted here. In addition, satellite operators receiving expansion spectrum under this process will be required to report on the actual number of subscriber minutes originating or terminating in unserved areas as a percentage of the actual U.S. system use, as part of their annual system-utilization reporting requirement.<sup>123</sup>

39. The benefits of 2 GHz MSS, including two-way voice, data, and Internet services, should be available to U.S. customers in all parts of the United States, including unserved areas.<sup>124</sup> We have carefully designed this incentive to complement the band arrangement we adopt today. We believe that assigning or designating additional spectrum to authorized 2 GHz MSS systems demonstrating concrete progress toward making satellite capacity available to unserved areas, as verified by reports of the number of subscriber minutes in these areas, will advance our objective of achieving universal access to telecommunications services as early as possible.

40. Some commenters urge us not to create incentives for 2 GHz operators to target their services to unserved areas.<sup>125</sup> These commenters believe that the Commission's geographic coverage

<sup>122</sup> We note that as of 1996, approximately 20 percent of the U.S. population lived in RSAs, based on census data indicating that 214 million people live in metropolitan areas (MAs), including MSAs, and a total U.S. population of 265 million people (derived from data published at U.S. Bureau of the Census, State and Metropolitan Area Data Book 1997, table B-1; U.S. Census Bureau, Current Population Reports, 25-311, 25-802, 25-1095 and "Monthly estimates of the United States population: April 1, 1980 to November 1, 1998"). We recognize that MAs, as described by the Census Bureau, may be overinclusive because they include MSAs, consolidated MSAs, and New England county metropolitan areas (NECMAs). This approximation, however, is sufficient for purposes of estimation.

<sup>123</sup> See Section III.C.4., *infra*.

<sup>124</sup> We also note that this spectrum has long been identified by the Commission for service to such areas. See *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314, Memorandum Opinion and Order, 9 FCC Rcd 4957, 4995-96 ¶¶ 94-97 (1994).

<sup>125</sup> Constellation Comments at 27; Globalstar Comments at 44-45; ICO Comments at 20; IUSG Comments at 44-45; Iridium Comments at 42; MCHI Comments at 26 (not supporting the proposals in the *Notice*); SIA Comments at 2-3 (not supporting the proposals in the *Notice*).

requirements and multiple licensing scheme already create market-based incentives for providing service to unserved areas.<sup>126</sup> Many of these commenters argue that the earth station or handset licensees, as opposed to the space station operators, are more appropriate entities for incentives because they will be Commercial Mobile Radio Service (CMRS) operators offering service on a non-discriminatory common-carrier basis.<sup>127</sup> These commenters argue that changes to the satellite system designs or business plans will not increase access to 2 GHz MSS in unserved areas. By contrast, Celsat asserts that satellite system operators design the space segment of the network to meet business plan and service pricing objectives.<sup>128</sup> We believe that Celsat's assertion has merit. By providing a spectrum-based incentive beyond a provider's selected assignment, we can encourage systems to consider deployment of service to unserved areas in the early business planning and system design phases. We also note that ICO has recently made a commitment to provide telephone and Internet service to non-commercial locations on Native American tribal lands at a discount of up to 50 percent from applicable retail rates.<sup>129</sup>

41. The commenters that oppose incentives for space segment operators suggest that the Commission may want to take positive steps to encourage access to Universal Service Funds by mobile earth station service providers by forbearing from regulations that make it difficult for these groups to obtain such funds.<sup>130</sup> As described above, the Commission recently adopted two Orders addressing issues regarding deployment of terrestrial and satellite telecommunications services to unserved areas, including tribal and insular areas.<sup>131</sup> In addition to our action here today, we recently adopted an order in which we stated that we will entertain waiver requests as necessary to overcome possible technical and administrative hurdles to facilitate deployment of service to certain unserved areas (i.e., tribal lands).<sup>132</sup> Our recent Order with respect to universal service elaborated on the process of designating eligible telecommunications carriers to receive specific Federal universal service support.<sup>133</sup> Consequently, it is unnecessary to take any further action in this item with respect to Universal Service Funds.

42. Several commenters also suggest that the Commission can actively support deployment of MSS to unserved areas by ensuring low-cost entry by minimizing relocation costs of 2 GHz incumbents.<sup>134</sup> Under our relocation policy,<sup>135</sup> the costs to 2 GHz MSS entrants have been reduced to the extent we believed possible, and we have provided maximum flexibility to MSS operators to provide service until the incumbents are relocated through the band arrangement we adopt today. These measures will significantly reduce any costs or burdens to MSS operators and should make availability of 2 GHz MSS capacity for service to unserved areas more economically viable.

43. Because it plans to provide aeronautical services, Boeing is concerned that its system may not qualify for any adopted incentive mechanism, depending on the definition of the term "unserved

<sup>126</sup> Constellation Comments at 28; Globalstar Comments at 44-45; ICO Comments at 19 n.59 & Reply at 23; IUSG Comments at 44 & Reply at 41; Iridium Comments at 41; Boeing Reply at 24.

<sup>127</sup> ICO Comments at 20-21 & Reply at 24; IUSG Comments at 44-45 & Reply at 41; Iridium Comments at 42.

<sup>128</sup> Celsat Reply at 20.

<sup>129</sup> See Eagle River/ICO *Ex Parte* Letter.

<sup>130</sup> Globalstar Comments at 44-45; MCHI Comments at 26-27; IUSG Comments at 44-45.

<sup>131</sup> See *supra* footnote 111 and accompanying text.

<sup>132</sup> *Wireless Tribal Order*, FCC 00-209, at ¶ 51.

<sup>133</sup> *Universal Service Twelfth R&O*, FCC 00-208, at ¶¶ 61, 109.

<sup>134</sup> ICO Comments at 20; IUSG Comments at 45-46; MCHI Comments at 26.

<sup>135</sup> See generally *2 GHz Second R&O and Second MO&O*, FCC 00-233.

communities.”<sup>136</sup> We cannot guarantee that Boeing would be in the position to satisfy the criterion for expansion spectrum or to be granted it. As described above, however, all authorized 2 GHz MSS systems, including Boeing, will be entitled to file requests demonstrating that they have satisfied the requisite criterion for seeking authority to use the unserved area spectrum. In addition, under the adopted band arrangement, Boeing will be able to obtain its selected spectrum unrelated to eligibility for the unserved area expansion spectrum.

44. Iridium expresses concern that any adopted incentives for service to unserved areas should apply equally to 2 GHz U.S.-licensees and LOI filers and must exclude Big LEO (1.6/2.4 GHz) licensees.<sup>137</sup> In response to Iridium, we clarify that the policies we adopt today for unserved area expansion spectrum apply equally to U.S. and foreign-licensed operators. In addition, we will not adopt any incentives concerning Big LEO spectrum at 1610-1626.5 MHz and 2483.5-2500 MHz as this proceeding is limited to 2 GHz MSS.

**e. System Amendments**

45. We have repeatedly emphasized that 2 GHz MSS system proponents will be afforded an opportunity to amend their applications and LOIs, if necessary, to bring them into conformity with the requirements and policies adopted for systems in these bands.<sup>138</sup> Although we did not seek comment on amendment procedures, Celsat requests that we dispense with an amendment period entirely to expedite the spectrum authorization process,<sup>139</sup> while MCHI requests a minimum three months to amend applications or LOIs as necessary.<sup>140</sup> Based on our decisions today, system proponents will need to amend their applications or LOIs in order to receive continued consideration,<sup>141</sup> even if the only amendment is an orbital debris narrative statement.<sup>142</sup> We also believe, however, that a three-month amendment period would unnecessarily delay our goal of expediting authorization of these systems, some of which have been on file since 1994.<sup>143</sup> Therefore, we will provide 30 days after a summary of this *Report and Order* is published in the Federal Register for system proponents to amend their filings, which is comparable to the length of time the Commission gave to the proposed Big LEO systems to file application amendments after release of the *Big LEO Report & Order*.<sup>144</sup>

<sup>136</sup> Boeing asserts that the aviation community should be included in the definition of “unserved communities.” Boeing Comments at 17-18. Boeing Reply at 24-25 (Boeing changed its initial support for the Commission’s proposal to provide incentives for service to unserved areas in its reply comments due to its concern that the aviation community may not be included in the definition of the term unserved communities).

<sup>137</sup> Iridium Comments at 43 n.79.

<sup>138</sup> See Notice, 14 FCC Rcd at 4848 ¶ 5; Public Notice, Report No. SPB-88, 12 FCC Rcd 10446 (1997).

<sup>139</sup> Celsat Comments at 4-5, Reply at 3-4 & Supplemental Comments at 6. Celsat’s support for its proposal, the streamlined licensing procedure used in the Ka-band first processing round, is inapposite because the Ka-band proponents came to a mutual agreement and were able to simply file a letter with the Commission stating their intention to construct its system in compliance with that agreement. No such agreement has been reached in the 2 GHz MSS processing round.

<sup>140</sup> MCHI Comments at 18.

<sup>141</sup> See, e.g., *Big LEO Report & Order*, 9 FCC Rcd at 5939 ¶ 2.

<sup>142</sup> See Section III.B.7., *infra*.

<sup>143</sup> See Notice, 14 FCC Rcd at 4847 ¶ 5.

<sup>144</sup> See *Big LEO Report & Order*, 9 FCC Rcd at 6023 ¶ 230.

## 2. Financial Qualifications

46. Historically, the Commission has fashioned financial requirements for satellite services on the basis of entry opportunities in the particular service being licensed.<sup>145</sup> Under Commission precedent, the purpose of financial qualification rules is to prevent warehousing and ensure quick deployment of service where there may be more applicants than available licenses.<sup>146</sup> In cases where we can accommodate all pending applications and future entry is possible, however, we have not looked to financial ability as a prerequisite to a license grant.<sup>147</sup> In the *Notice*, we tentatively concluded that analysis of financial qualifications would not be necessary in this 2 GHz MSS processing round because we believed the proposed 2 GHz MSS band arrangements could accommodate all proposed systems, and provide opportunities for future entry.<sup>148</sup> In addition, we sought comment on whether strict enforcement of milestones would better serve the goals on which financial qualification requirements are based.<sup>149</sup>

47. Many of the 2 GHz MSS system proponents oppose financial qualifications on the ground that implementation milestones alone will provide adequate assurances of project completion.<sup>150</sup> Several observe that financial standards are inappropriate because they are a barrier to entry, impede innovation, and substitute a flawed method for predicting success for the rigors of the marketplace.<sup>151</sup> Globalstar points out that it is common industry practice to acquire funding over an extended period of time, which suggests that milestones are more meaningful indicators than one-time financial qualifications.<sup>152</sup> Boeing and Inmarsat, however, stress the need for financial qualification standards, in order to eliminate delay caused by applicants not prepared to deploy services rapidly.<sup>153</sup>

48. We adopt our tentative conclusion not to impose financial qualification requirements for the current 2 GHz MSS processing round. As explained above, our adopted band arrangement accommodates all eligible systems with adequate spectrum to launch service. We also believe that future entry is possible, given our decision today to defer automatic redistribution of spectrum returned to the Commission as a result of missed milestones. Moreover, our decision to impose and strictly enforce milestone requirements will ensure timely construction of systems and deployment of service. BellSouth Corporation (BellSouth) contends that financial qualification requirements are necessary to ensure that MSS system proponents can meet obligations concerning incumbent relocation.<sup>154</sup> We disagree. Paying relocation costs is a necessary prerequisite to beginning service (unless the system's ability to share

<sup>145</sup> See, e.g., 47 C.F.R. §§ 25.140(c), 25.142(a)(4).

<sup>146</sup> See, e.g., *Big LEO Report & Order*, 9 FCC Rcd at 5948-50 ¶¶ 26-30.

<sup>147</sup> *Id.* at 5948 ¶ 26.

<sup>148</sup> *Notice*, 14 FCC Rcd at 4856 ¶ 24.

<sup>149</sup> *Id.*

<sup>150</sup> See Celsat Comments at 20-23 & Reply at 24; Constellation Comments at 3-4; Globalstar Comments at 6-8 & Reply at 19; ICO Comments at 5-6; MCHI Comments at 22; see also IUSG Comments at 38; Iridium Reply at 24.

<sup>151</sup> See, e.g., MCHI Comments at 22; Constellation Comments at 3-4; Celsat Comments at 20-23.

<sup>152</sup> Globalstar Comments at 6-7.

<sup>153</sup> Boeing Comments at 27-33; Inmarsat Comments at 15-16.

<sup>154</sup> Bell South Comments at 4-5 & Reply at 5-6. *Accord* Society of Broadcast Engineers, Inc. (SBE) Reply at 2. *Cf.* BellSouth Comments at 2-3 & Reply at 1-4 (suggesting that the Commission prescribe a competitive bidding licensing mechanism to ensure that the 2 GHz MSS spectrum is assigned to entities with the financial resources to commence service to the public promptly); *but see* TMI Comments at 8 (auctions would distort access to capital); SIA Comments at 3-4 (auctions would inhibit competition among global satellite systems).



spectrum exempts it from paying relocation costs). If a 2 GHz MSS system proponent does not have the funds to relocate incumbents, it cannot operate, and thus, the incumbent can continue operating in its original spectrum. We believe that this relocation process provides adequate marketplace incentives for 2 GHz MSS systems to obtain the necessary financing to commence and complete relocation in a timely fashion.

### 3. Technical Qualifications

49. The Commission traditionally has established threshold technical requirements for satellite systems to maximize use of the limited spectrum/orbit resource.<sup>155</sup> All 2 GHz applicants and LOI filers must meet our threshold qualification criteria to be eligible for licensing or spectrum reservation. In this section, we describe the minimum requirements, if any, for frequency agility, geographic coverage, and provision of Aeronautical Mobile-Satellite Route Service (“AMS(R)S”).

50. As we recognized in the *Notice*, the 2 GHz MSS system proponents have proposed different types of satellite system designs.<sup>156</sup> We remain committed to giving satellite system operators the flexibility to design and implement systems that will best meet the needs of their customers. At the same time, we remain committed to facilitating competition by maximizing the number of potential service suppliers. The technical rules adopted here are intended to further both these goals.

#### a. Frequency Agility

51. In the *Notice*, we proposed to require that 2 GHz MSS satellites and ground terminals be capable of operating across all portions of the 2 GHz MSS band (1990-2025 MHz and 2165-2200 MHz) in order to ensure flexibility in system coordination and operations.<sup>157</sup> TMI agrees with the proposal.<sup>158</sup> ICO and IUSG suggest that we adopt a requirement that NGSO systems should be capable of operating anywhere within 70 percent of the band and GSO operators should be capable of operating anywhere within 70 percent of the regional spectrum.<sup>159</sup> Inmarsat estimates that current technology would permit deployment of equipment that operates over a maximum of 30 megahertz in each direction.<sup>160</sup> Inmarsat opposes any requirement contending that the market will dictate whether manufacturers design their equipment to communicate over large portions of the band. ICO and IUSG also urge the Commission to adopt a rule requiring that system operators design their systems to be capable of unpaired frequency operation between the uplink and the downlink assignment segments;<sup>161</sup> that is, the ability of satellite systems to change frequencies used to transmit from earth stations to the satellite(s) and back.<sup>162</sup> ICO and IUSG argue that this requirement is necessary to facilitate frequency coordination with other MSS operators. These commenters also assert that requiring unpaired operation will reduce the burden of deployment during the transition with terrestrial incumbents.

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<sup>155</sup> 47 U.S.C. § 308(b).

<sup>156</sup> *Notice*, 14 FCC Rcd at 4853 ¶ 16.

<sup>157</sup> *Id.* at 4890 ¶ 107.

<sup>158</sup> TMI Comments at 4.

<sup>159</sup> ICO Comments at 22; IUSG Comments at 7-8.

<sup>160</sup> Inmarsat Comments at 17.

<sup>161</sup> Traditional “bent pipe” satellite systems use paired frequencies between the uplink and the downlink bands. The satellite sets the translation frequency between the transmit and receive bands.

<sup>162</sup> ICO Comments at 22 & Supplemental Comments at 7-8; IUSG Supplemental Comments at 7-8.

52. We do not adopt a requirement that 2 GHz MSS systems must be able to operate across the entire 2 GHz MSS band. Such a requirement is unnecessary given that, as a result of our band arrangement, regional allocation variations for international coordination, and incumbent relocation, systems must be capable of operating across large portions of the band anyway.<sup>163</sup> We do adopt a more limited requirement. Based on the comments, we believe that it is appropriate to require operators to be capable of operating across at least 70 percent of the U.S. 2 GHz MSS allocation (1990-2025 MHz and 2165-2200 MHz). We believe that it is important to design and launch 2 GHz MSS systems with sufficient flexibility to address coordination and band arrangement contingencies. This requirement comports with the current technical capabilities of system operators. We encourage system proponents to design their systems to be able to operate across more than 70 percent of the 2 GHz MSS bands in order to be able to provide the maximum amount of flexibility for spectrum use in the future.

53. With regard to unpaired frequency operation, we agree with ICO and IUSG and therefore adopt a requirement that 2 GHz MSS systems must be designed to be capable of changing the frequencies used to operate between the uplink and the downlink frequencies in their systems. This will provide for maximum flexibility in systems designs and assist in coordination of spectrum use among operators and with the transition of terrestrial incumbents in the bands.

54. Constellation requests that the Commission recognize that NGSO systems should be capable of operating in the 1980-1990 MHz band outside of the United States and that we authorize such systems for service outside the United States subject to protection of terrestrial systems in the United States.<sup>164</sup> Although the global systems here may be capable of operating in bands not available in the United States, and the ITU allocations in the 1980-1990 MHz portion of the band may be available in other regions of the world, we do not have the authority to license operations in other Regions. Operators will be required to obtain authorization from administrations in other regions in order to operate in those countries' territories. We recognize that 2 GHz MSS operators, particularly those proposing global systems, may be required to use the 1980-1990 MHz band in other countries and the 2015-2025 MHz band only in Region 2. We remind these operators that they will have to design their systems to be capable of meeting the requirements of spectrum coordination in all parts of the world in which they expect to provide service. We do not, however, mandate that systems be capable of operating in the 1980-1990 MHz band outside of the United States.

#### **b. Coverage Requirements**

55. *NGSO systems.* In the *Notice*, we proposed adoption of the same coverage requirements for 2 GHz MSS NGSO systems as we did for Big LEO systems.<sup>165</sup> We explained that we believed that the rationale for adopting coverage requirements in the Big LEO proceeding also applies here. We believe that balancing system cost against projected need and alternative service options favors requiring service only to areas sufficient to cover the majority of the populated areas on the Earth. We proposed 2 GHz MSS systems operating NGSO constellations be capable of serving locations as far north as 70° North latitude and as far south as 55° South latitude for at least 75 percent of every 24-hour period in order to cover the majority of the world's population. We also proposed a specific coverage requirement for the United States. Specifically, we proposed that NGSO MSS operators be required to provide

<sup>163</sup> See Section III.A.I.c., *supra* (band arrangement); Section III.E., *infra* (different regions may require operations on different frequency bands for the purposes of international coordination); 2 GHz Second R&O and Second MO&O, FCC 00-233 (incumbent relocation).

<sup>164</sup> Constellation Comments at 8-9.

<sup>165</sup> *Notice*, 14 FCC Rcd at 4854 ¶ 18.

continuous coverage throughout all 50 states, Puerto Rico, and U.S. territories and possessions, and specifically that at least one NGSO satellite must be visible above the horizon at an elevation angle of at least five degrees at all times, as we did for Big LEOs.<sup>166</sup>

56. The commenters support our proposed NGSO coverage requirement.<sup>167</sup> We, therefore, adopt our proposals and amend the Big LEO rules to require 2 GHz MSS systems to provide global coverage. This requirement is consistent with our Big LEO rules and will provide sufficient coverage for service to the majority of the populated areas on the Earth. We also amend our rules to require 2 GHz MSS operators to provide continuous coverage of the United States, as described above. This requirement will create service opportunities for all of the United States.<sup>168</sup>

57. Constellation requests that we clarify that the coverage requirements will apply equally to LOI filers.<sup>169</sup> As we have said in *DISCO II* and throughout this proceeding, we will apply our 2 GHz MSS operating requirements to all system operators. Therefore, LOI filers that will serve the United States, whether proposing NGSO or GSO systems, will be required to comply with the U.S. and worldwide coverage requirements.

58. *GSO systems.* In the *Notice*, we explained that individual GSO satellites have a fixed coverage area that is inherently regional.<sup>170</sup> Because of this characteristic, we did not propose a global coverage requirement for systems that use only GSO satellites. While we could have required GSO satellite system operators to provide global coverage such coverage would require additional satellites without providing any additional capabilities or capacity in the United States. Rather, we proposed to require such systems to provide coverage to all 50 states, Puerto Rico, and the U.S. Virgin Islands, unless the system operator can demonstrate that such coverage is technically *infeasible*.

59. We adopt our proposal. We recognize that the commenters may have been confused by slightly different language in the *text* of the *Notice* and the proposed *rule* section of the *Notice*.<sup>171</sup> The proposed rule proposes that operators be required to provide service to all 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically *feasible*.<sup>172</sup> We adopt our proposal as drafted in the proposed rule and

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<sup>166</sup> 47 C.F.R. § 25.143(b)(2)(ii)-(iii).

<sup>167</sup> Globalstar Comments at 4; ICO Comments at 4; Iridium Comments at 11.

<sup>168</sup> Celsat expresses concern that Boeing's system requirement for intra-network priority and preemptive access is inconsistent with our coverage proposal for NGSO systems because Boeing's priority and preemption requirements mean that Boeing would not be able to provide continuous service to all users in its system.<sup>168</sup> We disagree with Celsat. We find that our continuous coverage requirement does not prohibit customer priority or preemption between calls on the same system. In addition, the requirement does not require that systems exceed their inherent design capacity in order to attain uninterrupted service.

<sup>169</sup> Constellation Comments at 3.

<sup>170</sup> *Notice*, 14 FCC Rcd at 4854 ¶ 19.

<sup>171</sup> Constellation and Globalstar argue that the proposed rule is less stringent than the description of the proposed rule in the *text* of the *Notice*, which would require coverage unless technically *infeasible*. Constellation Comments at 3; Globalstar Comments at 4. Celsat and Iridium urge us to adopt the rule as described in the *text* of the *Notice*. Celsat Comments at 26; Iridium Comments at 11. On the other hand, Inmarsat favors a less stringent standard that it believes was proposed in the *rule* section of the *Notice*. Inmarsat Comments at 8-9 & Reply at 18-19. We disagree with the commenters who contend that one formulation of the rule is more or less stringent than the other. We do not believe that there is any substantive difference between the phrases "if technically feasible" and "unless technically infeasible."

<sup>172</sup> *Notice*, 14 FCC Rcd at 4905-06 (Appendix D, Sec. 25.143(b)(2)(iv)).

require GSO system operators to provide service to all 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically *feasible*. This requirement is the same as our geographic service requirement for direct broadcast satellite operators.<sup>173</sup> This requirement also provides reasonable parity with the NGSO coverage requirement. We recognize that GSO satellites located below a five degree elevation angle may not be capable of providing national coverage and do not require GSO operators to provide the geographic coverage specified above where a GSO satellite is located below a five degree elevation angle.<sup>174</sup>

60. In its comments, Globalstar asserts that the coverage requirements for hybrid NGSO/GSO systems should be aggregated.<sup>175</sup> We disagree with Globalstar. We believe that hybrid NGSO/GSO systems should be required to meet the same coverage requirements established for other satellite systems. For instance, the NGSO portion of a hybrid system will be required to comply with the coverage requirements for NGSO systems and the GSO portion will be required to comply with the coverage requirements for GSO systems.

**c. Provision of AMS(R)S**

61. Aeronautical Mobile-Satellite Route Service (AMS(R)S) is a radio communication service providing communications between aircraft earth stations via satellite and ground stations or other aircraft stations, reserved for communications pertaining to safety and regularity of flight along civil air routes.<sup>176</sup> Prior to the *Notice*, in the application phase of this proceeding, several parties argued that there are no specific international or national frequency allocations for AMS(R)S in the 2 GHz MSS bands.<sup>177</sup> In the comments, Aeronautical Radio, Inc. (ARINC) contends that an exclusive allocation is required for the provision of AMS(R)S in generic MSS spectrum.<sup>178</sup> Boeing contends, however, that the Commission's rules and the ITU Radio Regulations permit the provision of AMS(R)S in MSS spectrum.<sup>179</sup> Boeing asserts that domestic and international rules define AMS(R)S as a type of Aeronautical Mobile-Satellite Service (AMSS) and that AMSS is a sub-category of MSS.<sup>180</sup>

62. In the *Notice*, we sought comment on the feasibility of permitting Boeing to provide AMS(R)S in the 2 GHz MSS bands.<sup>181</sup> We stated that although we agree with Boeing's assertion that the absence of a specific AMS(R)S allocation does not prohibit the provision of AMS(R)S in MSS bands, there are additional domestic and international regulatory issues that must be addressed prior to commencing service.<sup>182</sup> We also explained that the domestic and international 2 GHz MSS allocations

<sup>173</sup> 47 C.F.R. § 100.53 (b).

<sup>174</sup> See Reduced Domestic Satellite Orbital Spacing at 4/6 GHz, FCC/OST R83-2 4-5 (May 1983) (view of a satellite below five degrees is not reliable due to atmospheric effects).

<sup>175</sup> Globalstar Comments at 4.

<sup>176</sup> See 47 C.F.R. § 2.1.

<sup>177</sup> See, e.g., Consolidated Comments and Petition to Deny of Iridium at 9 (filed May 5, 1998); Comments of Aeronautical Radio, Inc. at 4-5 (filed May 4, 1998); Comments of Celsat at 7 (filed May 4, 1998); Comments of Constellation at 20 (filed May 4, 1998); Consolidated Comments of ICO at 17-18 (filed May 4, 1998).

<sup>178</sup> ARINC Comments at 3.

<sup>179</sup> See Consolidated Opposition of Boeing at 9 (filed June 3, 1998).

<sup>180</sup> Boeing Comments at 3.

<sup>181</sup> *Notice*, 14 FCC Rcd at 4855-56 ¶ 22.

<sup>182</sup> *Id.* at 4855 ¶ 21.

do not include any regulatory provisions for AMS(R)S, especially for intra-network priority and preemptive access.<sup>183</sup>

63. Constellation, Inmarsat, and Iridium argue that the 2 GHz MSS allocation is for commercial mobile voice and personal communications services and that AMS(R)S is not compatible with this allocation.<sup>184</sup> ICO believes that it is premature to decide whether AMS(R)S should be permitted and that FCC action should be deferred until after the next World Radiocommunication Conference addressing the issue.<sup>185</sup> Constellation believes that the Commission should prohibit AMS(R)S operations in the 2 GHz bands.<sup>186</sup> In response, Boeing states that its system would serve the intended purpose of the allocation because it will serve the rural aviation community and provide global aviation safety benefits.<sup>187</sup>

64. As the Commission has stated in the past, AMSS is an example of MSS.<sup>188</sup> The Commission has also stated that AMSS includes AMS(R)S.<sup>189</sup> Therefore, we believe that Boeing can enter into contracts with members of the aviation community to provide AMS(R)S in the generic MSS allocation, with appropriate intra-network priority and preemption, without the need for any priority and preemption provision in the U.S. Table of Allocations.<sup>190</sup> Therefore, we adopt our decision not to propose any rule changes specifically to accommodate Boeing's proposal, and will consider Boeing's proposal as an MSS system in the licensing phase of this proceeding.

65. In addition, the *Notice* explained that the Commission's rules have specific requirements concerning licensing of terminals for aviation distress and safety communications.<sup>191</sup> These rules explicitly state which frequency bands may be used for aircraft-to-satellite AMS(R)S transmissions and do not include the 1990-2025/2165-2200 MHz bands.<sup>192</sup> Iridium and ARINC state that Part 87.187 and the U.S. Table of Frequency Allocations would need to be amended to permit the operation of Boeing's terminals, yet no rulemaking is pending.<sup>193</sup> Boeing states that it intends to file a petition for rulemaking with the Commission seeking a revision of Part 87 to permit aeronautical Earth stations to operate in the

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<sup>183</sup> *Id.*

<sup>184</sup> Constellation Comments at 5; Inmarsat Comments at 13-14; Iridium Comments at 9.

<sup>185</sup> ICO Comments at 5.

<sup>186</sup> Constellation Comments at 5.

<sup>187</sup> Boeing Reply at 6.

<sup>188</sup> See, e.g., *Amendment of Part 87 of the Commission's Rules to Establish Technical Standards and Licensing Procedures for Aircraft Earth Stations*, PR Docket No. 90-315, Report and Order, 7 FCC Rcd 5895, 5895 n.3 (1992).

<sup>189</sup> See, e.g., *Amendment of Parts 2, 22, and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Mobile Satellite Service for the Provision of Various Common Carrier Services*, GEN Docket No. 84-1234, Memorandum Opinion and Order, 4 FCC Rcd 6016, 6025 n.3 (1989).

<sup>190</sup> Priority and preemption contractual provisions may require the involvement of other federal agencies.

<sup>191</sup> *Notice*, 14 FCC Rcd at 4855 ¶ 21.

<sup>192</sup> See 47 C.F.R. § 87.187(q) and § 2.106 U.S. Table of Frequency Allocations.

<sup>193</sup> Iridium Comments at 8-9; ARINC Comments at 2.

2 GHz MSS frequency bands but does not believe that this should delay licensing of the satellite portion of the proposed system.<sup>194</sup>

66. We agree with the commenters stating that Part 87 will have to be amended or waived to permit Boeing to operate AMS(R)S earth stations in the United States. We do not, however, undertake those regulatory changes here because it involves issues outside the scope of this proceeding and will require a separate notice and comment process.

67. The commenters raise other domestic and international regulatory issues related to Boeing's application.<sup>195</sup> While we recognize that there are remaining issues concerning provision of AMS(R)S in the 2 GHz MSS bands, we believe that the appropriate place to address these system-specific concerns is in the licensing phase of this proceeding. Therefore, we will address such and any public comments on the system application and amendments at that time.

## B. Non-Service Link Issues

68. To this point, we have discussed rules and policies regarding the service link portion of an MSS system, *i.e.*, the transmission path between the MSS satellite and a customer's Mobile Earth Terminal (MET). In addition to service links, MSS networks require separate frequencies for feeder links, tracking, telemetry, and command (TT&C), and in some cases, inter-satellite links (collectively, "non-service links"). Feeder links are the radio links that transmit a user's messages in both directions between the system's satellites and its gateway earth station(s) that connect the MSS network with the public switched telephone network.<sup>196</sup> Tracking, telemetry, and command (TT&C) communications provide data on a satellite's functions via a two-way telemetry link between the satellite and a controlling earth station, or control center.<sup>197</sup> Some system designs also use frequencies in the inter-satellite service (ISS) to provide links by which satellites in a constellation may communicate with each other. The 2 GHz MSS system proponents seek feeder link, TT&C and ISS frequencies in a variety of bands, and in one case, radionavigation frequencies not germane to the operation of the MSS system.<sup>198</sup>

69. While we are optimistic that sufficient spectrum will be available to support 2 GHz MSS non-service link operations, at this time, we are not certain when that will occur. As described in more detail below, authorization of these requested frequency bands for non-service links remain subject to resolution in other proceedings.<sup>199</sup> We agree with PanAmSat Corporation (PanAmSat) and Society of

<sup>194</sup> Boeing Comments at 13-14.

<sup>195</sup> For example, several commenters are concerned about interference from and to Boeing's system and object to any special coordination status for AMS(R)S in the 2 GHz MSS spectrum. Constellation Comments at 5; Globalstar Comments at 4-6 & Reply at 21-22; Inmarsat Comments at 13 & Reply at 18; Iridium Comments at 8 & Reply at 45-46; National Telecommunications and Information Administration (NTIA) Comments at 18; TMI Comments at 3. As stated above, we will address those concerns when we consider Boeing's application for licensing.

<sup>196</sup> Gateway earth stations also perform billing and call-management functions.

<sup>197</sup> TT&C communications are used throughout the satellite's life, including the launch and deployment phase, to monitor the health of the spacecraft. The TT&C function allows the earth station to control the satellite's physical orbital position and internal functioning.

<sup>198</sup> See Notice, 14 FCC Rcd at 4865-74 ¶¶ 49-70.

<sup>199</sup> See Amendment of Parts 2, 25 and 97 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz, ET Docket No. 98-142, Notice of Proposed Rule Making, 13 FCC Rcd 17107 (1998) (5, 7, 15 GHz Allocation NPRM); Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range, ET Docket No.